



RADIO TEST REPORT

Test Report No. : 10949091S-A

Applicant : TAIYO YUDEN CO., LTD.
Type of Equipment : CPU Embedded WLAN Module
Model No. : WYSACVLXY
FCC ID : RYYWYSACVLXY
Test regulation : FCC Part 15 Subpart C: 2015
Test Result : Complied

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
6. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)

Date of test: September 24 to October 18, 2015

Representative test engineer:

Kenichi Adachi

Engineer

Consumer Technology Division

Approved by:

Toyokazu Imamura

Leader

Consumer Technology Division



- ☒ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
☐ There is no testing item of "Non-accreditation".

UL Japan, Inc.

Shonan EMC Lab.

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13-EM-F0429

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SECTION 1: Customer information

Company Name	:	TAIYO YUDEN CO., LTD.
Address	:	8-1, Sakae-cho, Takasaki-shi, Gunma 370-8522, Japan
Telephone Number	:	+81-27-324-2313
Facsimile Number	:	+81-27-324-2314
Contact Person	:	Junich Fukuda

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment	:	CPU Embedded WLAN Module
Model No.	:	WYSACVLXY
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 3.3 V
Receipt Date of Sample	:	September 5, 2015
Country of Mass-production	:	Japan
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab

2.2 Product Description

Model: WYSACVLXY (referred to as the EUT in this report) is a CPU Embedded WLAN Module.

General Specification

Clock frequency(ies) in the system	:	38.4 MHz
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Radio Specification

Radio Type	:	Transceiver
Frequency of Operation	:	2412 MHz - 2462 MHz
Modulation	:	DSSS
Power Supply (radio part input)	:	DC 1.8 V
Antenna type	:	1/4 monopole
Antenna Gain	:	-2.9 dBi

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2015, final revised on September 8, 2015
 Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
 Section 15.207 Conducted limits
 Section 15.247 Operation within the bands 902-928 MHz,
 2400-2483.5 MHz, and 5725-5850 MHz

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.4-2009 7. AC powerline Conducted Emission measurements IC: RSS-Gen 8.8	FCC: Section 15.207 IC: RSS-Gen 8.8	12.6 dB, 27.57580 MHz, N AV, Tx 2437 MHz, IEEE 802.11g	Complied	-
6 dB Bandwidth	FCC: KDB 558074 D01 DTS Meas Guidance v03r03 IC: -	FCC: Section 15.247(a)(2) IC: RSS-247 5.2(1)	See data.	Complied	Conducted
Maximum Peak Output Power	FCC: KDB 558074 D01 DTS Meas Guidance v03r03 IC: RSS-Gen 6.12	FCC: Section 15.247(b)(3) IC: RSS-247 5.4(4)		Complied	Conducted
Power Density	FCC: KDB 558074 D01 DTS Meas Guidance v03r03 IC: -	FCC: Section 15.247(e) IC: RSS-247 5.2(2)		Complied	Conducted
Spurious Emission Restricted Band Edges	FCC: KDB 558074 D01 DTS Meas Guidance v03r03 IC: RSS-Gen 6.13	FCC: Section 15.247(d) IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	2.6 dB 2483.500 MHz, AV, Hori. Tx 2462 MHz, IEEE 802.11n-20	Complied	Radiated

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.

* In case any questions arise about test procedure, ANSI C63.10: 2013 is also referred.
 However, there is one deviation from ANSI C 63.10:2013. (ANSI C63.10:2013 is Non-accreditation)
 Measurement height is not 1.5 m, but 0.8 m.

FCC Part 15.31 (e)

The RF Module has its own regulator. The RF part is constantly provided voltage (DC 1.8 V) through the regulator regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 / 212

The antenna is not removable from the EUT. Therefore, the equipment complies with the requirement.

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99 % Occupied Bandwidth	IC: RSS-Gen 6.6	IC: -	N/A	-	Conducted

Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor $k = 2$.
Shonan EMC Lab.

Item	Frequency range	Uncertainty (+/-)		
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	3.6 dB	3.4 dB	3.4 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.7 dB	3.5 dB	3.5 dB
	30 MHz-300 MHz	4.9 dB	4.9 dB	4.7 dB
	300 MHz-1 GHz	5.0 dB	5.0 dB	4.8 dB
	1 GHz-13 GHz	4.9 dB	4.9 dB	4.9 dB
Radiated emission (Measurement distance: 1 m)	13 GHz-18 GHz	5.7 dB	5.7 dB	5.7 dB
	18 GHz-40 GHz	4.5 dB	4.3 dB	4.3 dB

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector)_SPM-06	0.76 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	0.79 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.74 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	1.08 dB
Spurious emission (Conducted) below 1GHz	1.5 dB
Spurious emission (Conducted) 1 GHz-3 GHz	1.7 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.4 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.5 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.5 dB
Bandwidth Measurement	0.66 %
Duty cycle and Time Measurement	0.012 %

Conducted Emission test

The data listed in this test report has enough margin, more than the site margin.

Radiated emission test

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

3.5 Test Location

UL Japan, Inc. Shonan EMC Lab.
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JAB Accreditation No. RTL02610

Test site	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
No.4 Semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
No.1 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.2 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.3 Shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
No.4 Shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
No.5 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.6 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.8 shielded room	-	3.45 x 5.5 x 2.4	3.45 x 5.5	-
No.1 Measurement room	-	2.55 x 4.1 x 2.5	-	-

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

SECTION 4: Operation of E.U.T. during testing

4.1 Operating Mode(s)

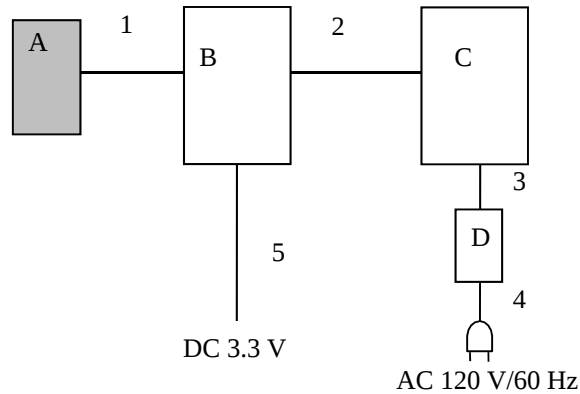
Test operating mode was determined as follows according to “Section 1 of 6 802.11 a/b/g/n testing - Managing Complex Regulatory Approvals - ” of TCB Council Workshop October 20093

Mode	Remarks*
Tx (Transmitting), IEEE 802.11b (11b)	11 Mbps, PN9
Tx (Transmitting), IEEE 802.11g (11g)	54 Mbps, PN9
Tx (Transmitting), IEEE 802.11n 20 MHz BW (11n-20)	MCS7 , PN9
*The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel)	
Power settings: 11b:15 dBm, 11g:9 dBm, 11n-20:9 dBm	
Software: Dut labtool, ver:2.1.0.13	

*The details of Operating mode(s)

Test Item	Operating Mode	Tested frequency
Conducted Emission	Tx, 11b	2412 MHz, 2437 MHz, 2462 MHz
Spurious Emission	Tx, 11g	
6 dB Bandwidth	Tx, 11n-20	
Maximum Peak Output Power		
Power Density		
99 % Occupied Bandwidth		

4.2 Configuration and peripherals



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	CPU Embedded WLAN Module	WYSACVLXY	2	TAIYO YUDEN CO., LTD.	EUT
B	Jig	-	-	TAIYO YUDEN CO., LTD.	-
C	Laptop PC	FMVNC2GC3	R6308297	FUJITSU	-
D	AC Adapter	FMV-AC314	04838087E	SANKEN ELECTRIC CO., LTD.	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Signal	0.1	Unshielded	Unshielded	-
2	USB	0.8	Shielded	Shielded	-
3	DC	1.8	Unshielded	Unshielded	-
4	AC	2.0	Unshielded	Unshielded	-
5	DC	0.4+1.0	Unshielded	Unshielded	-

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SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a platform of nominal size, 1.0 m by 2.0 m, raised 0.8 m above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity.

The rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.

I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane. All unused 50ohm connectors of the LISN (AMN) were resistivity terminated in 50 ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT via DC power supply in a Shielded room.

The EUT via DC power supply was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Detector	: QP and CISPR AV
Measurement range	: 0.15 MHz – 30 MHz
Test data	: APPENDIX
Test result	: Pass

SECTION 6: Radiated Spurious Emission

Test Procedure

It was measured based on "11.0 Emissions in non-restricted frequency bands" of "558074 D01 DTS Meas Guidance v03r03".

EUT was placed on a polystyrene platform of nominal size, 0.5 m by 0.5 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane. The height of the measuring antenna varied between 1 m and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer. The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

The test was made with the detector (RBW/VBW) in the following table.

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

Frequency	Below 30 MHz	30 MHz to 300 MHz	300 MHz to 1 GHz	Above 1 GHz
Antenna Type	Loop	Biconical	Logperiodic	Horn

In any 100 kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9(IC) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (IC).

Frequency	9 kHz to 90 kHz & 110 kHz to 150 kHz	90 kHz to 110 kHz	150 kHz to 490 kHz	490 kHz to 30 MHz	Below 1 GHz	Above 1 GHz	20 dBc
Instrument used	Test Receiver					Spectrum Analyzer	Spectrum Analyzer
Detector	PK/AV	QP	PK/AV	QP	QP	PK	AV *3)
IF Bandwidth	200 Hz	200 Hz	10 kHz	9 kHz	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	Average Power Method: RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (Linear voltage) Trace: 100 traces Duty factor was added to the results.
Test Distance	3 m	3 m	3 m	3 m	3 m	3 m (below 13 GHz), 1 m *2) (above 13 GHz)	3 m (below 13 GHz), 1 m *2) (above 13 GHz)
Distance factor *1)	-80 dB	-80 dB	-80 dB	-40 dB	-	*2)	-

*1) FCC 15.31 (f)(2) (9kHz-30MHz)

Distance Factor: $40 \times \log(3 \text{ m} / 300 \text{ m}) = -80 \text{ dB}$

Distance Factor: $40 \times \log(3 \text{ m} / 30 \text{ m}) = -40 \text{ dB}$

*2) Distance Factor: $20 \times \log(3.0 \text{ m} / 1.0 \text{ m}) = 9.5 \text{ dB}$

*3) Average Power Measurement was measured based on 13.3.2 of KDB 558074 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247".

The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Worst position:

	Below 1 GHz	1 G-2.8 GHz	2.8 G-13 GHz	13 G-18 GHz	18 G-25 GHz
Horizontal	X	X	X	X	X
Vertical	X	Z	Z	Z	X

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Measurement range : 9 k - 25 GHz

Test data : APPENDIX

Test result : Pass

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SECTION 7: Antenna Terminal Conducted Tests

Test Procedure

The tests were made with below setting connected to the antenna port.

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
6 dB Bandwidth	20 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99 % Occupied Bandwidth *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Sample	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak/Average *2)	-	Power Meter (Sensor: 50 MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3 kHz	9.1 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious Emission *4)	9kHz to 150kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	10 kHz	30 kHz				

*1) Peak hold was applied as Worst-case measurement.

*2) Reference data

*3) Section 10.2 Method PKPSD (peak PSD) of "KDB 558074 D01 DTS Meas Guidance v03r03".

*4) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.

Then, wide-band noise near the limit was checked separately and the noise was detected as shown in the chart, and therefore, Radiated Emission below 30MHz was performed.

The test results and limit are rounded off to two decimals place, so some differences might be observed.

Test data	: APPENDIX
Test result	: Pass

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APPENDIX 1: Test data

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.2 Shielded Room
Date : 2015/10/15

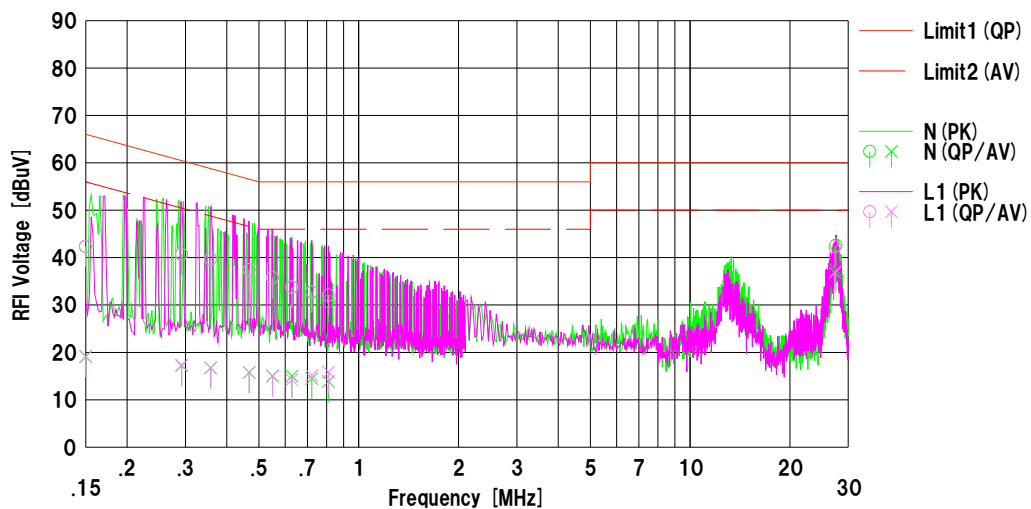
Mode : Tx, 11g, 2437 MHz

Remarks : -

Temp./Humi. : 24 deg.C / 44 %RH

Limit1 : FCC 15C (15.207) QP
Limit2 : FCC 15C (15.207) AV

Engineer : Takahiro Suzuki



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15000	29.82	6.63	12.51	42.33	19.14	66.00	56.00	23.6	36.8	N	
2	0.29209	28.25	4.77	12.53	40.78	17.30	60.46	50.46	19.6	33.1	N	
3	0.35777	27.16	4.18	12.55	39.71	16.73	58.78	48.78	19.0	32.0	N	
4	0.46725	24.82	3.18	12.58	37.40	15.76	56.56	46.56	19.1	30.8	N	
5	0.54936	23.17	2.45	12.58	35.75	15.03	56.00	46.00	20.2	30.9	N	
6	0.62849	21.21	2.39	12.60	33.81	14.99	56.00	46.00	22.1	31.0	N	
7	0.72220	20.05	1.87	12.61	32.66	14.48	56.00	46.00	23.3	31.5	N	
8	0.81086	18.14	1.28	12.59	30.73	13.87	56.00	46.00	25.2	32.1	N	
9	27.57580	28.72	23.45	13.90	42.62	37.35	60.00	50.00	17.3	12.6	N	
10	0.15000	29.84	6.54	12.51	42.35	19.09	66.00	56.00	23.6	36.9	L1	
11	0.29209	28.12	4.63	12.53	40.65	17.16	60.46	50.46	19.8	33.3	L1	
12	0.35777	27.15	4.18	12.55	39.70	16.73	58.78	48.78	19.0	32.0	L1	
13	0.46725	24.82	3.18	12.58	37.40	15.76	56.56	46.56	19.1	30.8	L1	
14	0.54936	23.19	2.47	12.58	35.77	15.05	56.00	46.00	20.2	30.9	L1	
15	0.62849	21.13	1.64	12.60	33.73	14.24	56.00	46.00	22.2	31.7	L1	
16	0.72220	20.21	2.58	12.61	32.82	15.19	56.00	46.00	23.1	30.8	L1	
17	0.81086	19.48	3.25	12.59	32.07	15.84	56.00	46.00	23.9	30.1	L1	
18	27.34500	28.36	22.92	13.89	42.25	36.81	60.00	50.00	17.7	13.1	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]
LISN: SLS-03

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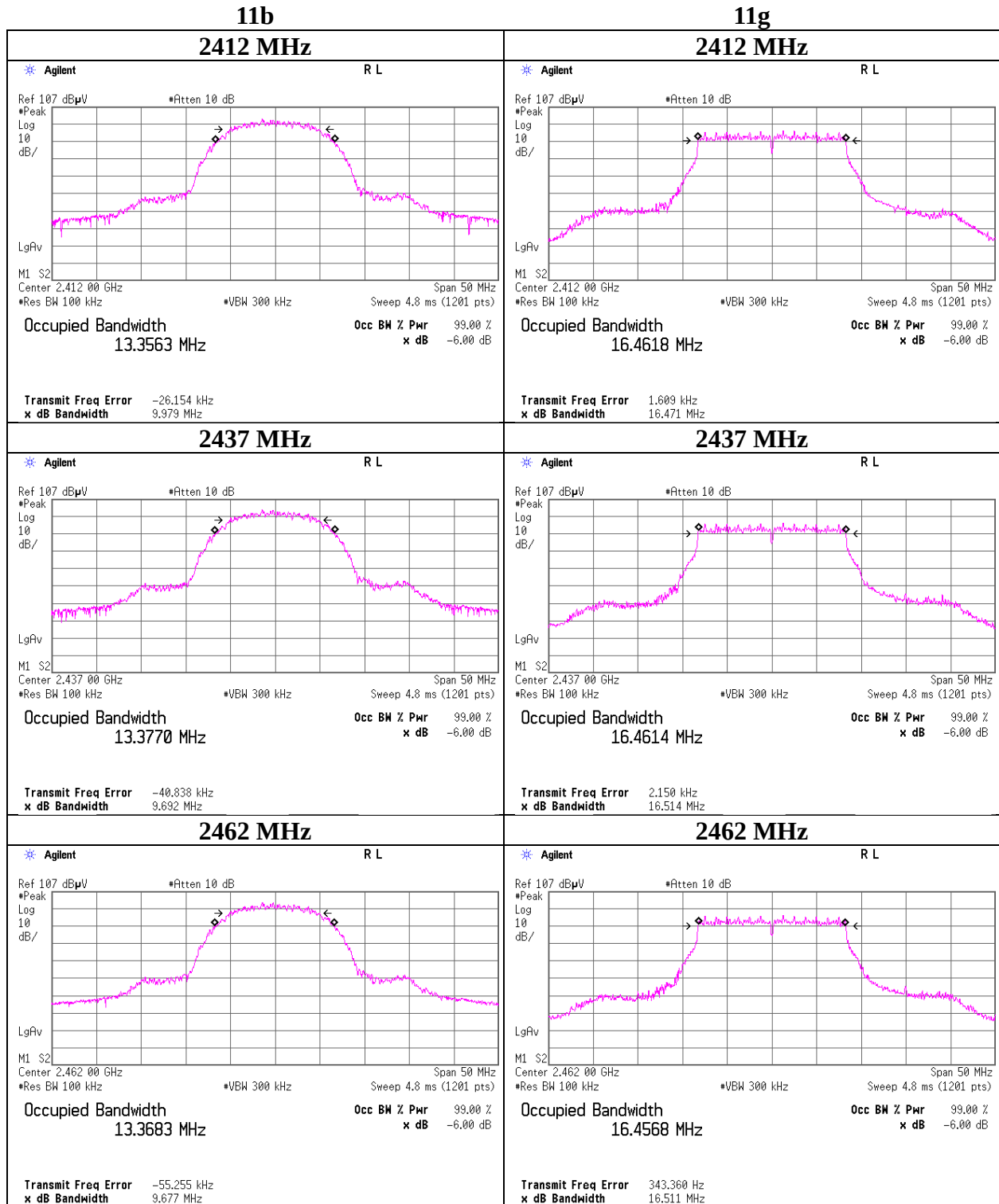
Facsimile : +81 463 50 6401

6 dB Bandwidth

Test place Shonan EMC Lab. No.2 Shielded Room
Report No. 10949091S-A
Date September 24, 2015
Temperature / Humidity 24 deg. C / 48 % RH
Engineer Kenichi Adachi
Mode Tx

Mode	Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
11b	2412	9.979	> 500
	2437	9.692	> 500
	2462	9.677	> 500
11g	2412	16.471	> 500
	2437	16.514	> 500
	2462	16.511	> 500
11n-20	2412	17.714	> 500
	2437	17.724	> 500
	2462	17.713	> 500

6 dB Bandwidth



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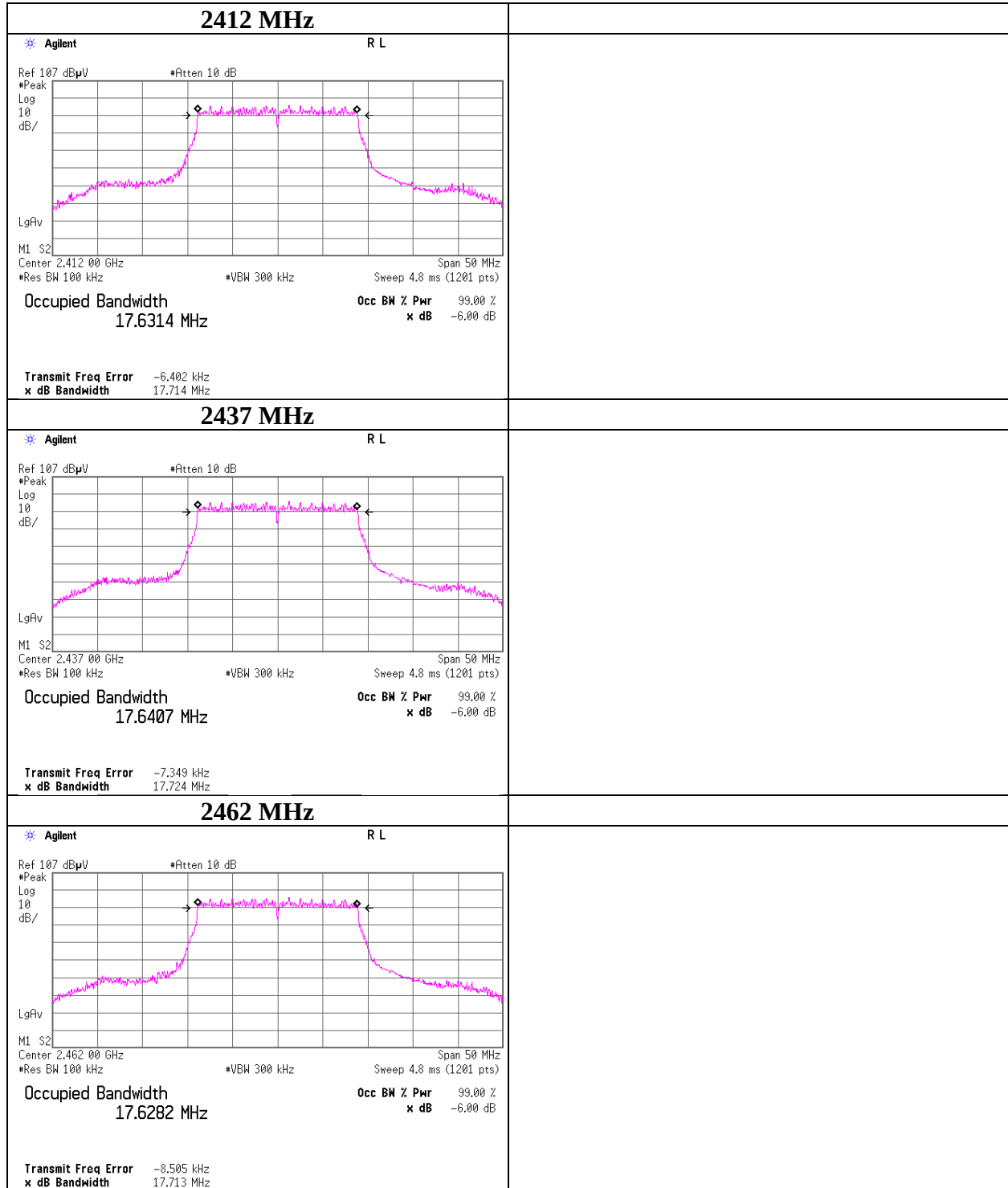
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6 dB Bandwidth

11n-20



Maximum Peak Output Power

Test place Shonan EMC Lab. No.2 Shielded Room
Report No. 10949091S-A
Date September 24, 2015
Temperature / Humidity 24 deg. C / 48 % RH
Engineer Kenichi Adachi
Mode Tx 11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	5.28	2.08	9.93	17.29	53.58	30.00	1000	12.71
2437	5.83	2.09	9.93	17.85	60.95	30.00	1000	12.15
2462	5.63	2.10	9.93	17.66	58.34	30.00	1000	12.34

Sample Calculation:

Result = Reading + Cable Loss + Attenuator Loss

2437MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
1	5.82	
2	5.81	
5.5	5.49	
11	5.83	*

*: Worst Rate

All comparison were carried out on same frequency and measurement factors.

Maximum Peak Output Power

Test place Shonan EMC Lab. No.2 Shielded Room
Report No. 10949091S-A
Date September 24, 2015
Temperature / Humidity 24 deg. C / 48 % RH
Engineer Kenichi Adachi
Mode Tx 11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	7.24	2.08	9.93	19.25	84.14	30.00	1000	10.75
2437	7.33	2.09	9.93	19.35	86.10	30.00	1000	10.65
2462	7.24	2.10	9.93	19.27	84.53	30.00	1000	10.73

Sample Calculation:

Result = Reading + Cable Loss + Attenuator Loss

2437 MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
6	7.16	
9	6.63	
12	6.48	
18	6.86	
24	7.32	
36	6.73	
48	7.15	
54	7.33	*

*: Worst Rate

All comparison were carried out on same frequency and measurement factors.

Maximum Peak Output Power

Test place Shonan EMC Lab. No.2 Shielded Room
Report No. 10949091S-A
Date September 24, 2015
Temperature / Humidity 24 deg. C / 48 % RH
Engineer Kenichi Adachi
Mode Tx 11n-20

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	6.64	2.08	9.93	18.65	73.28	30.00	1000	11.35
2437	7.24	2.09	9.93	19.26	84.33	30.00	1000	10.74
2462	6.34	2.10	9.93	18.37	68.71	30.00	1000	11.63

Sample Calculation:

Result = Reading + Cable Loss + Attenuator Loss

2437 MHz

MCS Number	Reading [dBm]	Remark
0	7.18	
1	7.16	
2	6.82	
3	6.66	
4	6.79	
5	7.01	
6	7.23	
7	7.24	*

Worst MCS

Average Output Power (Reference data)

Test place	Shonan EMC Lab. No.2 Shielded Room
Report No.	10949091S-A
Date	September 24, 2015
Temperature / Humidity	24 deg. C / 48 % RH
Engineer	Kenichi Adachi
Mode	Tx

11b 11 Mbps (worst (average power))

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2412	2.39	2.08	9.93	14.40	27.54	0.05	14.45	27.86
2437	3.03	2.09	9.93	15.05	31.99	0.05	15.10	32.36
2462	2.83	2.10	9.93	14.86	30.62	0.05	14.91	30.97

11g 54 Mbps (worst (average power))

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-3.13	2.08	9.93	8.88	7.73	0.23	9.11	8.15
2437	-3.06	2.09	9.93	8.96	7.87	0.23	9.19	8.30
2462	-3.31	2.10	9.93	8.72	7.45	0.23	8.95	7.85

11n-20 MCS 0 (worst (average power))

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-3.19	2.08	9.93	8.82	7.62	0.03	8.85	7.67
2437	-2.91	2.09	9.93	9.11	8.15	0.03	9.14	8.20
2462	-3.55	2.10	9.93	8.48	7.05	0.03	8.51	7.10

Sample Calculation:

Result (Frame power) = Reading + Cable Loss + Attenuator

Result (Burst power) = Frame power + Duty factor

Average Output Power
(Reference data)

Test place : Shonan EMC Lab. No.2 Shielded Room
Report No. : 10949091S-A
Date : September 24, 2015
Temperature / Humidity : 24 deg. C / 48 % RH
Engineer : Kenichi Adachi
Mode : Tx

2437 MHz

Mode	Rate Mbps	Reading [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11b	1	3.03	0.00	3.03	
	2	3.02	0.00	3.03	
	5.5	2.67	0.02	2.68	
	11	3.03	0.05	3.08	*
11g	6	-3.22	0.02	-3.20	
	9	-3.25	0.04	-3.21	
	12	-3.25	0.05	-3.20	
	18	-2.92	0.08	-2.84	
	24	-3.04	0.11	-2.93	
	36	-3.49	0.16	-3.33	
	48	-3.41	0.20	-3.21	
	54	-3.06	0.23	-2.83	*
11n-20	0	-2.91	0.03	-2.88	*
	1	-2.98	0.06	-2.92	
	2	-3.11	0.09	-3.02	
	3	-3.09	0.11	-2.98	
	4	-3.11	0.16	-2.95	
	5	-3.15	0.20	-2.95	
	6	-3.14	0.22	-2.92	
	7	-3.20	0.24	-2.96	

* Worst rate

Sample Calculation:

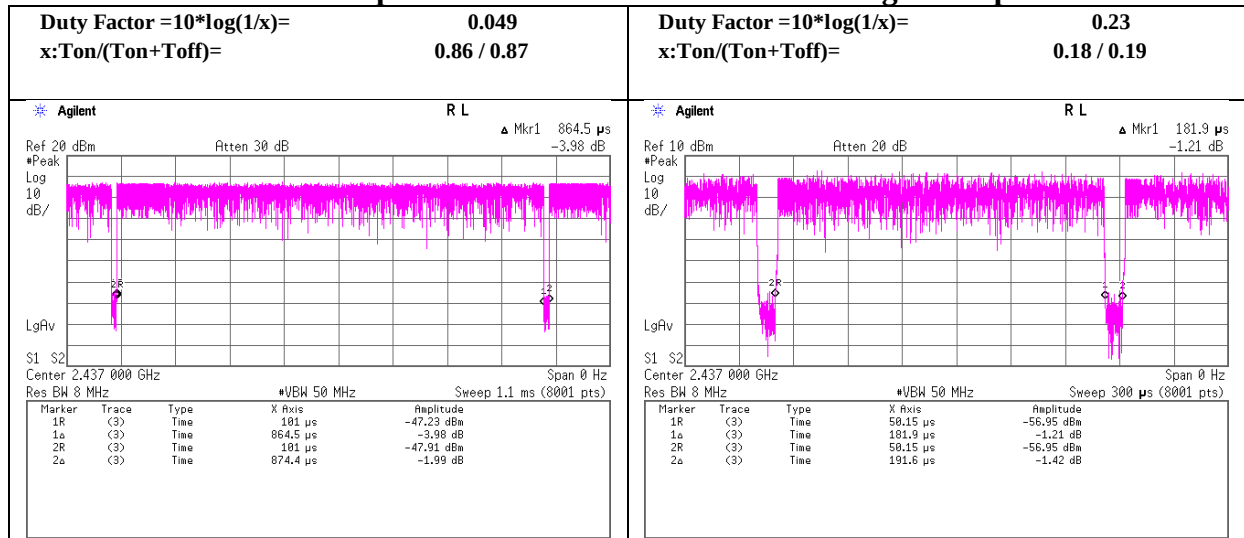
Burst power = Reading (timed average) + Duty factor

All comparison were carried out on same frequency and measurement factors.

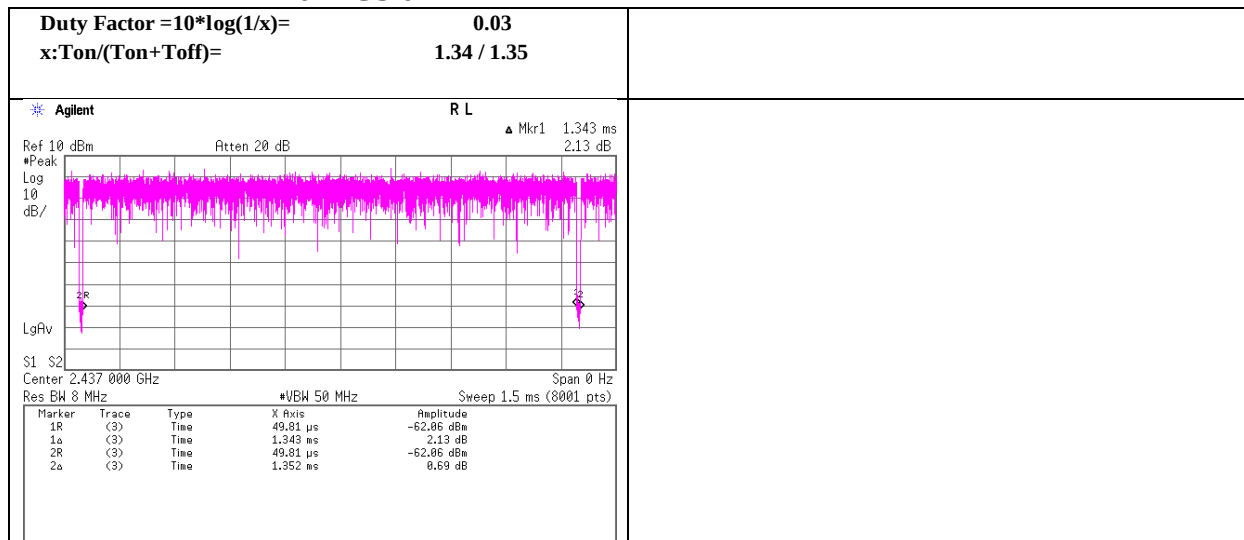
Burst rate confirmation (for average output power)

Test place	Shonan EMC Lab. No.2 Shielded Room
Report No.	10949091S-A
Date	September 24, 2015
Temperature / Humidity	24 deg. C / 48 % RH
Engineer	Kenichi Adachi
Mode	Tx

11b 11 Mbps



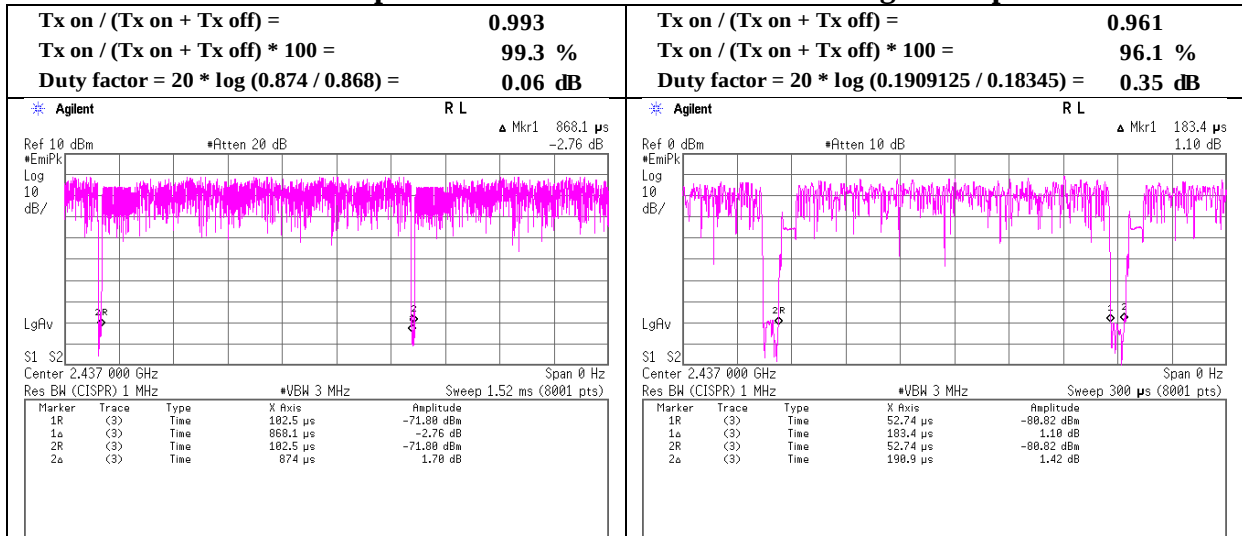
11n-20 MCS 0



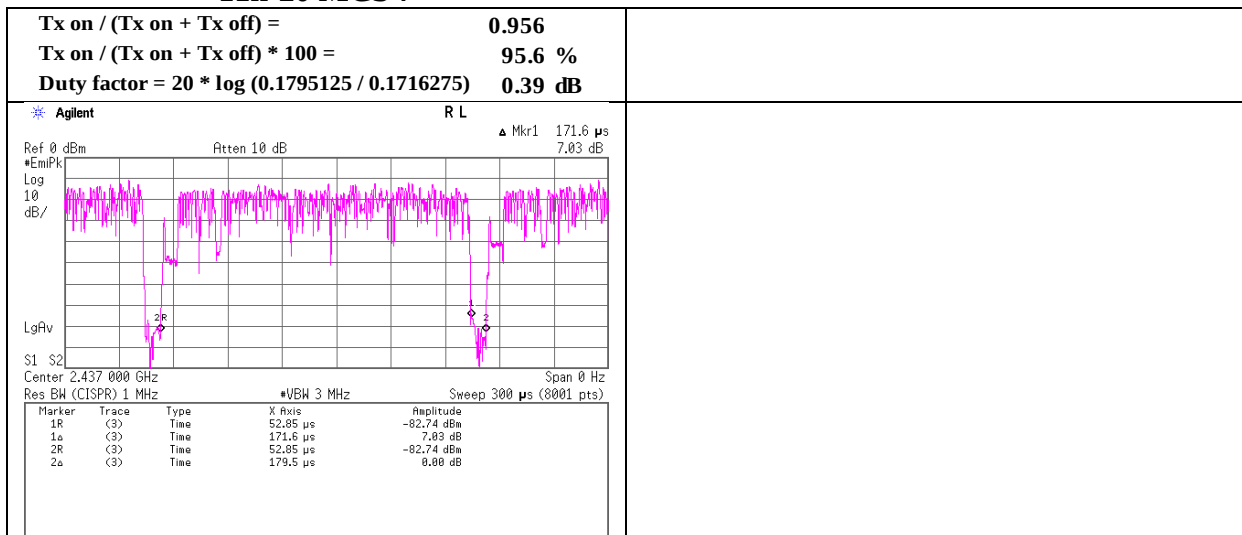
Burst rate confirmation (for Spurious)

Test place	Shonan EMC Lab. No.2 Shielded Room
Report No.	10949091S-A
Date	September 24, 2015
Temperature / Humidity	24 deg. C / 48 % RH
Engineer	Kenichi Adachi
Mode	Tx

11b 11 Mbps



11n-20 MCS 7



Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 10949091S-A
Date : October 11, 2015 October 18, 2015
Temperature / Humidity : 25 deg. C / 51 % RH 25 deg. C / 50 % RH
Engineer : Kenichi Adachi Hikaru Shirasawa
(1-13 GHz) (13-25 GHz)
Mode : Tx 11b 2412 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	51.0	27.8	13.7	41.0	3.5	55.0	73.9	18.9	100	277	
Hori.	4824.000	PK	47.3	31.5	5.6	39.5	3.5	48.4	73.9	25.5	123	1	
Hori.	7236.000	PK	46.1	36.9	6.9	40.1	3.5	53.3	73.9	20.6	100	0	
Hori.	9648.000	PK	44.9	38.5	8.1	39.6	3.5	55.4	73.9	18.5	100	171	
Hori.	12060.000	PK	43.5	39.7	8.9	39.3	3.5	56.3	73.9	17.6	100	0	
Hori.	2390.000	AV	36.5	27.8	13.7	41.0	3.5	40.5	53.9	13.4	100	277	
Hori.	4824.000	AV	37.7	31.5	5.6	39.5	3.5	38.8	53.9	15.1	123	1	
Hori.	7236.000	AV	35.8	36.9	6.9	40.1	3.5	43.0	53.9	10.9	100	0	
Hori.	9648.000	AV	35.0	38.5	8.1	39.6	3.5	45.5	53.9	8.4	100	171	
Hori.	12060.000	AV	34.9	39.7	8.9	39.3	3.5	47.7	53.9	6.2	100	0	
Vert.	2390.000	PK	48.7	27.8	13.7	41.0	3.5	52.7	73.9	21.2	100	187	
Vert.	4824.000	PK	46.1	31.5	5.6	39.5	3.5	47.2	73.9	26.7	150	349	
Vert.	7236.000	PK	46.0	36.9	6.9	40.1	3.5	53.2	73.9	20.7	100	0	
Vert.	9648.000	PK	44.8	38.5	8.1	39.6	3.5	55.3	73.9	18.6	100	183	
Vert.	12060.000	PK	43.4	39.7	8.9	39.3	3.5	56.2	73.9	17.7	100	0	
Vert.	2390.000	AV	36.4	27.8	13.7	41.0	3.5	40.4	53.9	13.5	100	187	
Vert.	4824.000	AV	36.4	31.5	5.6	39.5	3.5	37.5	53.9	16.4	150	349	
Vert.	7236.000	AV	35.7	36.9	6.9	40.1	3.5	42.9	53.9	11.0	100	0	
Vert.	9648.000	AV	34.9	38.5	8.1	39.6	3.5	45.4	53.9	8.5	100	183	
Vert.	12060.000	AV	34.8	39.7	8.9	39.3	3.5	47.6	53.9	6.3	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(4.47\text{ m} / 3.0\text{ m}) = 3.5\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	92.5	27.8	13.7	41.0	3.5	96.5	-	-	Carrier
Hori.	2400.000	PK	45.7	27.8	13.7	41.0	3.5	49.7	76.5	26.8	
Vert.	2412.000	PK	91.2	27.8	13.7	41.0	3.5	95.2	-	-	Carrier
Vert.	2400.000	PK	45.5	27.8	13.7	41.0	3.5	49.5	75.2	25.7	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(4.47\text{ m} / 3.0\text{ m}) = 3.5\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

UL Japan, Inc.

Shonan EMC Lab.

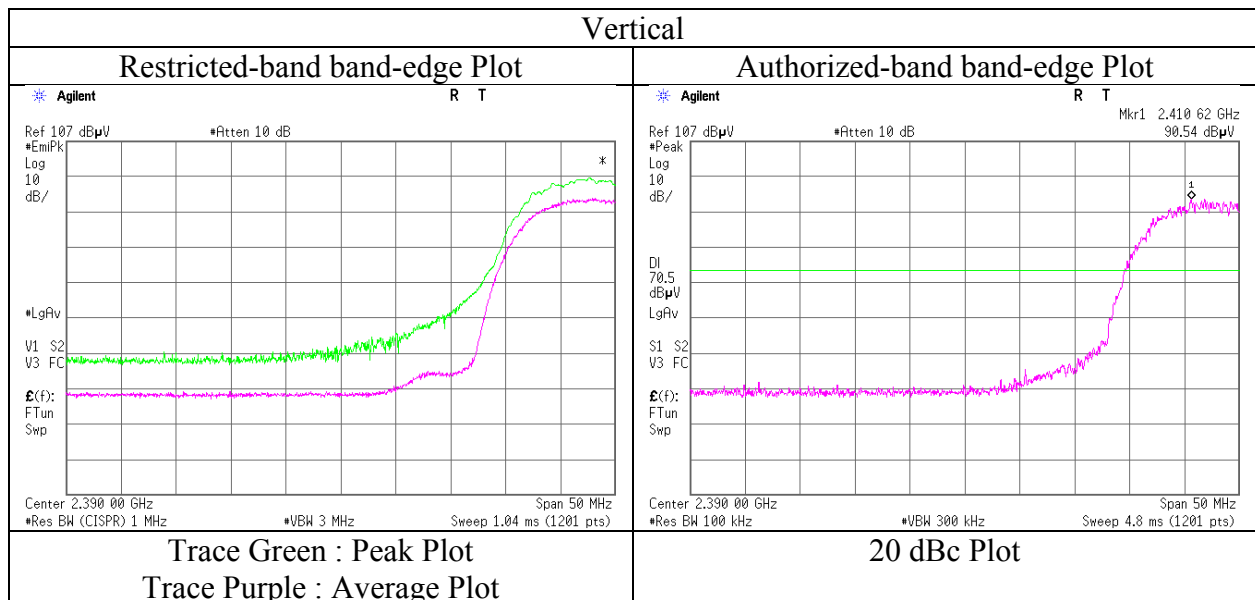
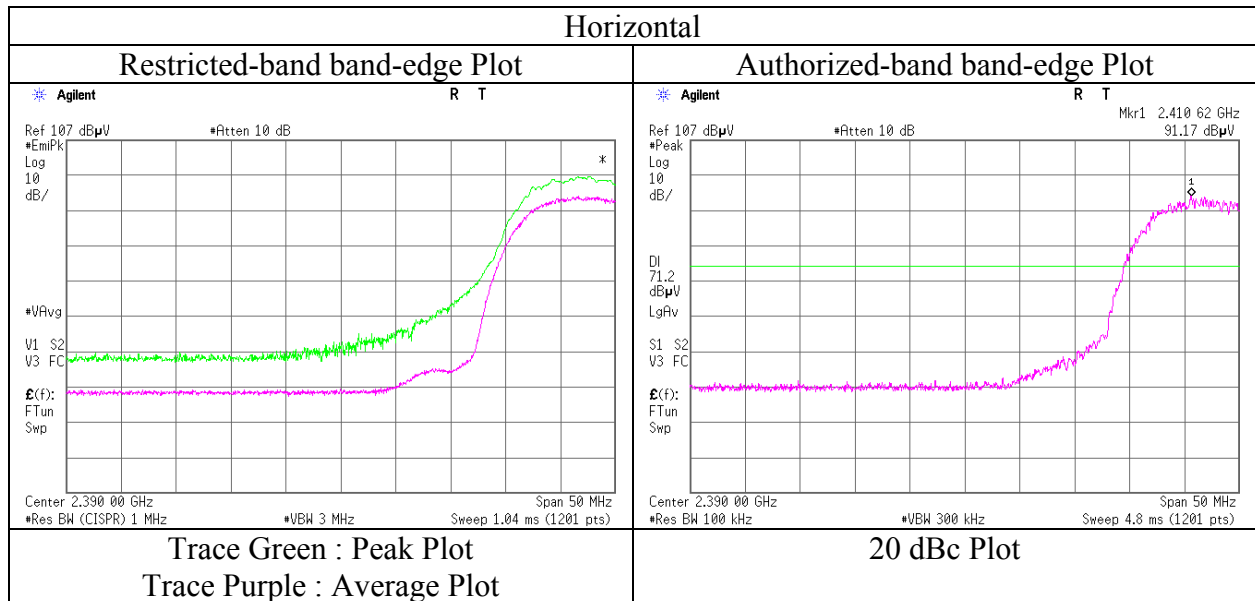
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10949091S-A
Date	October 11, 2015
Temperature / Humidity	25 deg. C / 51 % RH
Engineer	Kenichi Adachi
Mode	Tx 11b 2412 MHz



* Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 10949091S-A
Date : October 11, 2015 October 18, 2015
Temperature / Humidity : 25 deg. C / 51 % RH 25 deg. C / 50 % RH
Engineer : Kenichi Adachi Hikaru Shirasawa
(1-13 GHz) (13-25 GHz)
Mode : Tx 11b 2437 MHz

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	4874.000	PK	46.7	31.7	5.7	39.5	3.5	48.1	73.9	25.8	111	236	
Hori.	7311.000	PK	45.3	36.9	7.0	40.2	3.5	52.5	73.9	21.4	100	0	
Hori.	9748.000	PK	45.0	38.5	8.1	39.5	3.5	55.6	73.9	18.3	100	176	
Hori.	12185.000	PK	44.8	39.6	9.0	39.4	3.5	57.5	73.9	16.4	100	0	
Hori.	4874.000	AV	37.2	31.7	5.7	39.5	3.5	38.6	53.9	15.3	111	236	
Hori.	7311.000	AV	36.3	36.9	7.0	40.2	3.5	43.5	53.9	10.4	100	0	
Hori.	9748.000	AV	35.1	38.5	8.1	39.5	3.5	45.7	53.9	8.2	100	176	
Hori.	12185.000	AV	35.0	39.6	9.0	39.4	3.5	47.7	53.9	6.2	100	0	
Vert.	4874.000	PK	47.7	31.7	5.7	39.5	3.5	49.1	73.9	24.8	110	314	
Vert.	7311.000	PK	45.2	36.9	7.0	40.2	3.5	52.4	73.9	21.5	100	0	
Vert.	9748.000	PK	44.9	38.5	8.1	39.5	3.5	55.5	73.9	18.4	100	182	
Vert.	12185.000	PK	44.7	39.6	9.0	39.4	3.5	57.4	73.9	16.5	100	0	
Vert.	4874.000	AV	37.6	31.7	5.7	39.5	3.5	39.0	53.9	14.9	110	314	
Vert.	7311.000	AV	36.2	36.9	7.0	40.2	3.5	43.4	53.9	10.5	100	0	
Vert.	9748.000	AV	35.0	38.5	8.1	39.5	3.5	45.6	53.9	8.3	100	182	
Vert.	12185.000	AV	34.9	39.6	9.0	39.4	3.5	47.6	53.9	6.3	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(4.47\text{ m} / 3.0\text{ m}) = 3.5\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission

Test place Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. 10949091S-A
Date October 11, 2015 October 18, 2015
Temperature / Humidity 25 deg. C / 51 % RH 25 deg. C / 50 % RH
Engineer Kenichi Adachi Hikaru Shirasawa
(1-13 GHz) (13-25 GHz)
Mode Tx 11b 2462 MHz

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	58.1	27.9	13.7	41.0	3.5	62.2	73.9	11.7	100	276	
Hori.	4924.000	PK	48.1	31.9	5.7	39.4	3.5	49.8	73.9	24.1	121	242	
Hori.	7386.000	PK	46.4	36.9	7.0	40.3	3.5	53.5	73.9	20.4	100	0	
Hori.	9848.000	PK	45.9	38.5	8.2	39.4	3.5	56.7	73.9	17.2	100	174	
Hori.	12310.000	PK	44.1	39.6	9.0	39.5	3.5	56.7	73.9	17.2	100	0	
Hori.	2483.500	AV	42.0	27.9	13.7	41.0	3.5	46.1	53.9	7.8	100	276	
Hori.	4924.000	AV	38.8	31.9	5.7	39.4	3.5	40.5	53.9	13.4	121	242	
Hori.	7386.000	AV	37.6	36.9	7.0	40.3	3.5	44.7	53.9	9.2	100	0	
Hori.	9848.000	AV	35.3	38.5	8.2	39.4	3.5	46.1	53.9	7.8	100	174	
Hori.	12310.000	AV	34.8	39.6	9.0	39.5	3.5	47.4	53.9	6.5	100	0	
Vert.	2483.500	PK	53.9	27.9	13.7	41.0	3.5	58.0	73.9	15.9	100	188	
Vert.	4924.000	PK	48.8	31.9	5.7	39.4	3.5	50.5	73.9	23.4	115	291	
Vert.	7386.000	PK	46.5	36.9	7.0	40.3	3.5	53.6	73.9	20.3	100	0	
Vert.	9848.000	PK	45.6	38.5	8.2	39.4	3.5	56.4	73.9	17.5	100	185	
Vert.	12310.000	PK	44.2	39.6	9.0	39.5	3.5	56.8	73.9	17.1	100	0	
Vert.	2483.500	AV	38.7	27.9	13.7	41.0	3.5	42.8	53.9	11.1	100	188	
Vert.	4924.000	AV	39.9	31.9	5.7	39.4	3.5	41.6	53.9	12.3	115	291	
Vert.	7386.000	AV	37.7	36.9	7.0	40.3	3.5	44.8	53.9	9.1	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(4.47\text{ m} / 3.0\text{ m}) = 3.5\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

UL Japan, Inc.

Shonan EMC Lab.

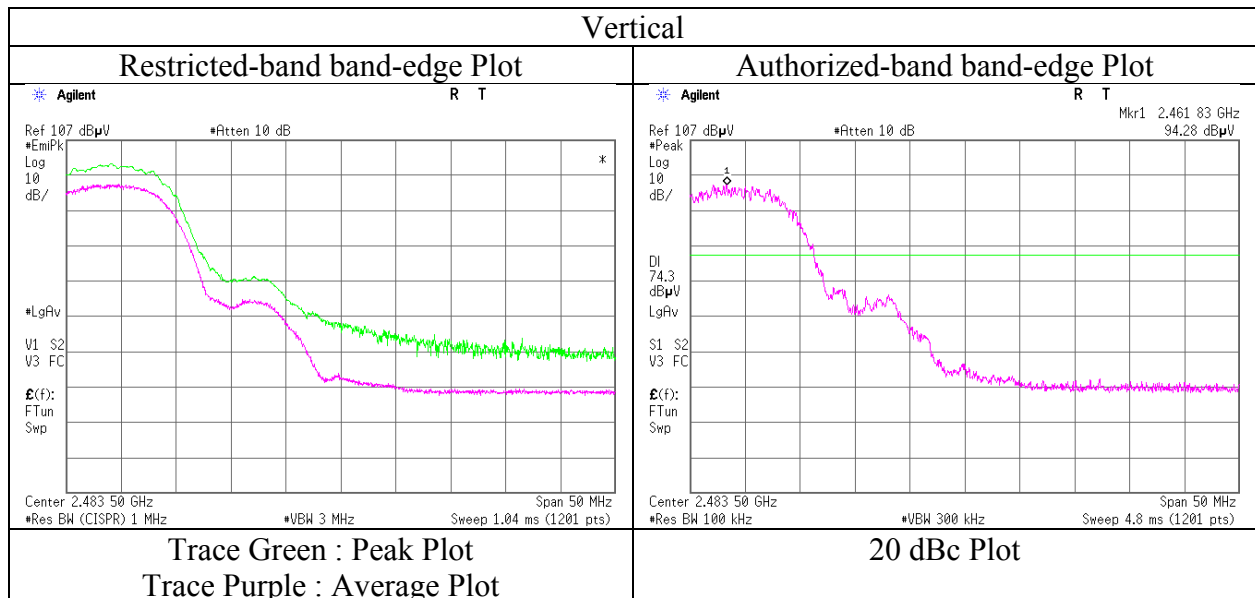
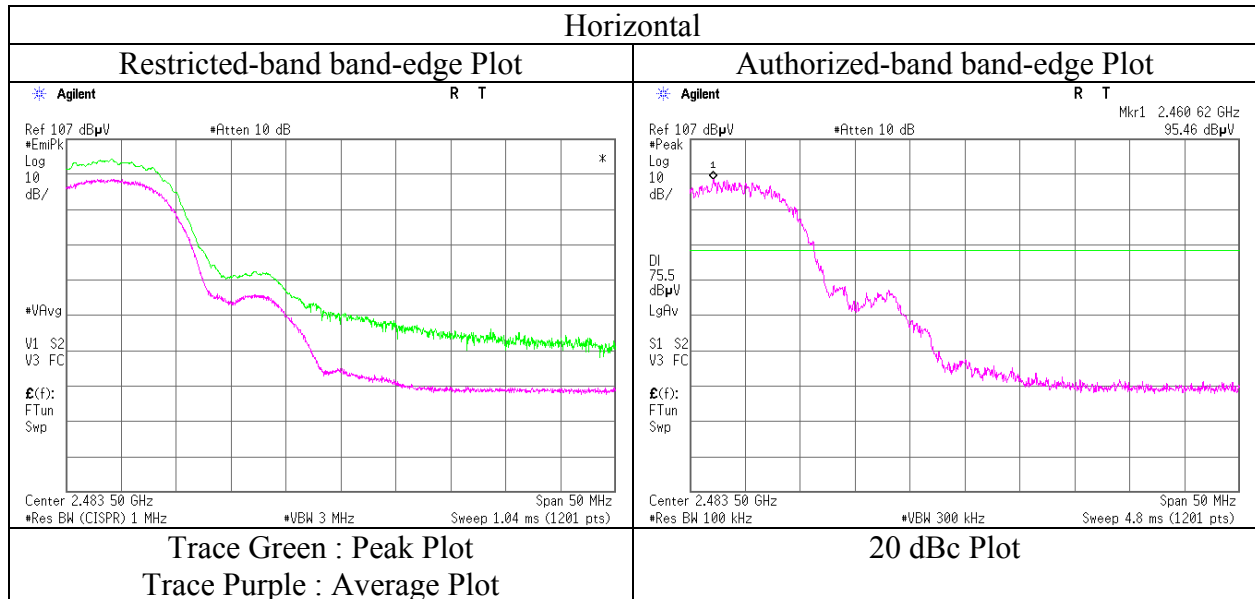
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10949091S-A
Date	October 11, 2015
Temperature / Humidity	25 deg. C / 51 % RH
Engineer	Kenichi Adachi
Mode	Tx 11b 2462 MHz



* Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 10949091S-A
Date : October 11, 2015 October 18, 2015
Temperature / Humidity : 25 deg. C / 51 % RH 25 deg. C / 50 % RH
Engineer : Kenichi Adachi Hikaru Shirasawa
(1-13 GHz) (13-25 GHz)
Mode : Tx 11g 2412 MHz

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	46.2	27.8	13.7	41.0	3.5	50.2	73.9	23.7	100	273	
Hori.	4824.000	PK	45.3	31.5	5.6	39.5	3.5	46.4	73.9	27.5	118	0	
Hori.	7236.000	PK	46.0	36.9	6.9	40.1	3.5	53.2	73.9	20.7	100	0	
Hori.	9648.000	PK	44.7	38.5	8.1	39.6	3.5	55.2	73.9	18.7	100	175	
Hori.	12060.000	PK	43.4	39.7	8.9	39.3	3.5	56.2	73.9	17.7	100	0	
Vert.	2390.000	PK	45.8	27.8	13.7	41.0	3.5	49.8	73.9	24.1	100	185	
Vert.	4824.000	PK	44.6	31.5	5.6	39.5	3.5	45.7	73.9	28.2	119	322	
Vert.	7236.000	PK	46.1	36.9	6.9	40.1	3.5	53.3	73.9	20.6	100	0	
Vert.	9648.000	PK	44.3	38.5	8.1	39.6	3.5	54.8	73.9	19.1	100	181	
Vert.	12060.000	PK	43.5	39.7	8.9	39.3	3.5	56.3	73.9	17.6	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (4.47 m / 3.0 m) = 3.5 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	36.4	27.8	13.7	41.0	0.4	3.5	40.8	53.9	13.2	*1)
Hori.	4824.000	AV	36.3	31.5	5.6	39.5	0.4	3.5	37.8	53.9	16.2	
Hori.	7236.000	AV	35.7	36.9	6.9	40.1	0.4	3.5	43.3	53.9	10.7	
Hori.	9648.000	AV	34.7	38.5	8.1	39.6	0.4	3.5	45.6	53.9	8.4	
Hori.	12060.000	AV	34.8	39.7	8.9	39.3	0.4	3.5	48.0	53.9	5.9	
Vert.	2390.000	AV	36.3	27.8	13.7	41.0	0.4	3.5	40.7	53.9	13.3	*1)
Vert.	4824.000	AV	35.5	31.5	5.6	39.5	0.4	3.5	37.0	53.9	17.0	
Vert.	7236.000	AV	35.8	36.9	6.9	40.1	0.4	3.5	43.4	53.9	10.6	
Vert.	9648.000	AV	34.5	38.5	8.1	39.6	0.4	3.5	45.4	53.9	8.6	
Vert.	12060.000	AV	34.9	39.7	8.9	39.3	0.4	3.5	48.1	53.9	5.8	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (4.47 m / 3.0 m) = 3.5 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB

Duty factor refer to "Duty factor Calculation chart" sheet.

*1) Not out of band emission (Leakage Power)

20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	86.6	27.8	13.7	41.0	3.5	90.6	-	-	Carrier
Hori.	2400.000	PK	44.0	27.8	13.7	41.0	3.5	48.0	70.6	22.6	
Vert.	2412.000	PK	85.3	27.8	13.7	41.0	3.5	89.3	-	-	Carrier
Vert.	2400.000	PK	43.8	27.8	13.7	41.0	3.5	47.8	69.3	21.5	

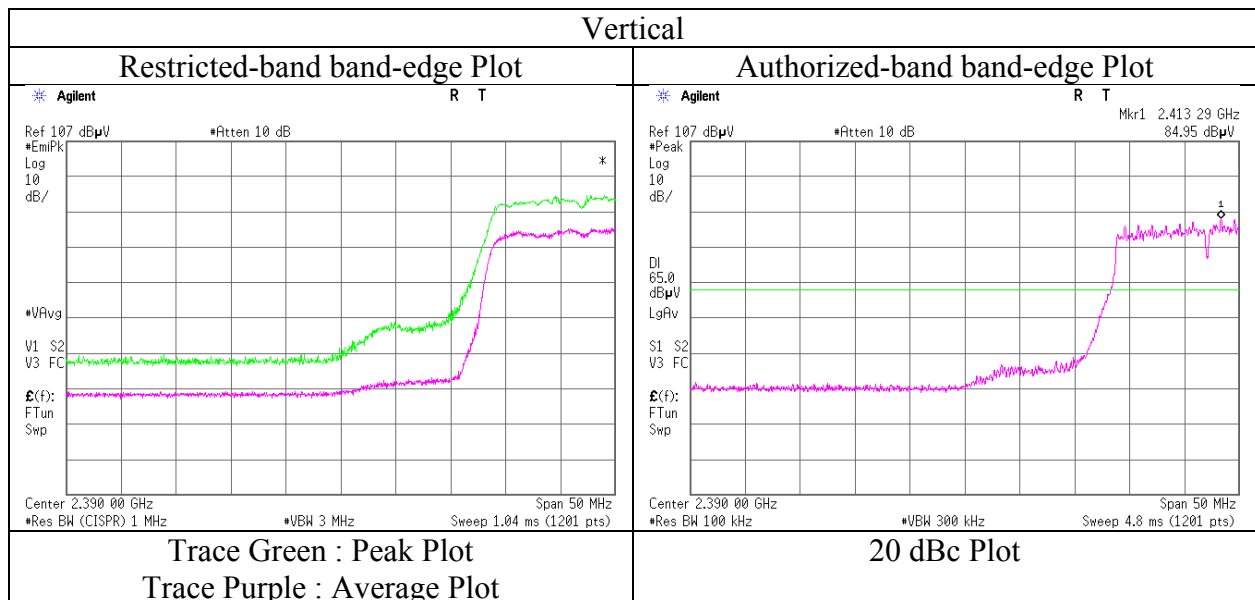
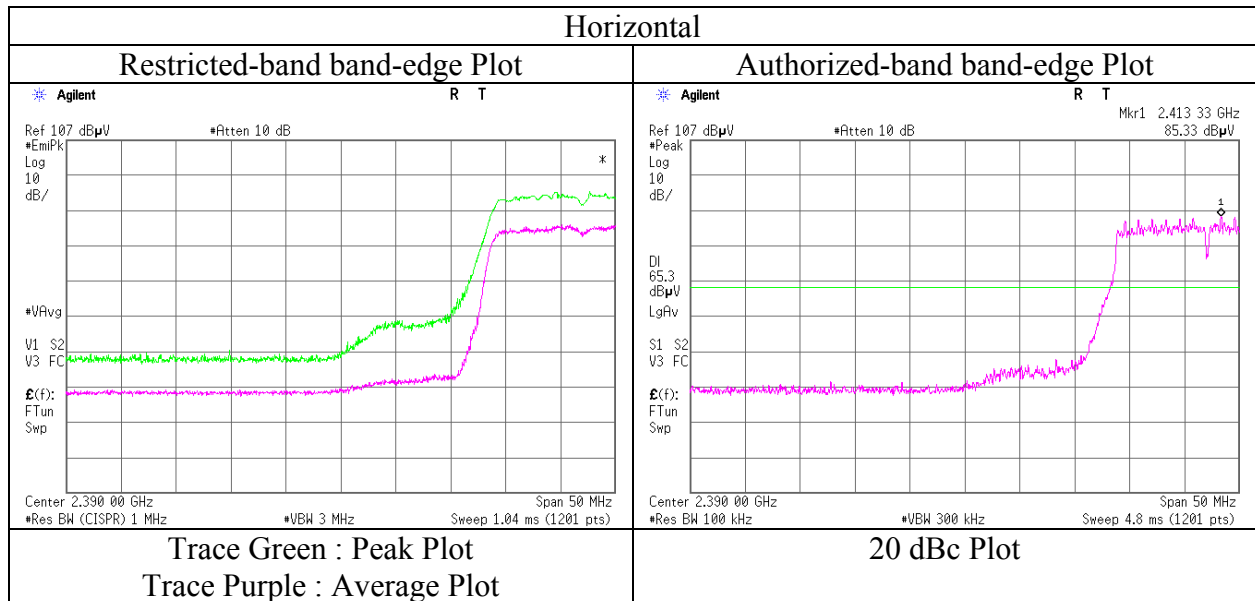
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (4.47 m / 3.0 m) = 3.5 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10949091S-A
Date	October 11, 2015
Temperature / Humidity	25 deg. C / 51 % RH
Engineer	Kenichi Adachi
Mode	Tx 11g 2412 MHz



* Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.3 and No.2 Semi Anechoic Chamber		
Report No.	10949091S-A		
Date	October 11, 2015	October 18, 2015	October 14, 2015
Temperature / Humidity	25 deg. C / 51 % RH	25 deg. C / 50 % RH	24 deg. C / 46 % RH
Engineer	Kenichi Adachi	Hikaru Shirasawa	Takahiro Suzuki
	(1-13 GHz)	(13-25 GHz)	(9 kHz-1 GHz)
	(No.3 SAC)	(No.3 SAC)	(No.2 SAC)
Mode	Tx 11g 2437 MHz		

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	0.023	AV	33.5	19.9	-74.2	30.3	0.0	-51.1	40.4	91.4	100	213	
Hori.	0.055	AV	25.8	19.7	-74.1	30.7	0.0	-59.5	32.8	92.2	100	37	
Hori.	0.066	AV	24.5	19.6	-74.1	30.9	0.0	-60.9	31.1	92.0	100	174	
Hori.	0.150	AV	18.2	19.4	-74.1	32.0	0.0	-68.5	24.0	92.5	100	172	
Hori.	0.023	PK	42.4	19.9	-74.2	30.3	0.0	-42.2	60.4	102.6	100	213	
Hori.	0.055	PK	34.8	19.7	-74.1	30.7	0.0	-50.4	52.8	103.2	100	37	
Hori.	0.066	PK	32.5	19.6	-74.1	30.9	0.0	-52.9	51.2	104.0	100	174	
Hori.	0.150	PK	27.5	19.4	-74.1	32.0	0.0	-59.2	44.0	103.2	100	172	
Hori.	73.853	QP	47.5	6.3	7.6	31.9	0.0	29.5	40.0	10.5	253	64	
Hori.	194.482	QP	36.1	16.3	8.7	31.8	0.0	29.3	43.5	14.2	218	232	
Hori.	299.259	QP	28.6	19.4	9.7	31.7	0.0	26.0	46.0	20.0	241	297	
Hori.	365.026	QP	40.6	16.4	7.0	31.6	0.0	32.4	46.0	13.6	100	298	
Hori.	431.988	QP	41.3	17.7	7.4	31.6	0.0	34.8	46.0	11.2	100	305	
Hori.	455.826	QP	36.3	18.0	7.6	31.6	0.0	30.3	46.0	15.7	100	110	
Hori.	4874.000	PK	45.6	31.7	5.7	39.5	3.5	47.0	73.9	26.9	112	239	
Hori.	7311.000	PK	45.2	36.9	7.0	40.2	3.5	52.4	73.9	21.5	100	0	
Hori.	9748.000	PK	45.0	38.5	8.1	39.5	3.5	55.6	73.9	18.3	100	174	
Hori.	12185.000	PK	44.7	39.6	9.0	39.4	3.5	57.4	73.9	16.5	100	0	
Vert.	0.023	AV	33.4	19.9	-74.2	30.3	0.0	-51.2	40.4	91.6	100	11	
Vert.	0.055	AV	25.7	19.7	-74.1	30.7	0.0	-59.6	32.8	92.3	100	61	
Vert.	0.066	AV	23.8	19.6	-74.1	30.9	0.0	-61.6	31.1	92.7	100	332	
Vert.	0.150	AV	33.5	19.4	-74.1	32.0	0.0	-53.1	24.0	77.1	100	171	
Vert.	0.023	PK	45.3	19.9	-74.2	30.3	0.0	-39.2	60.4	99.6	100	11	
Vert.	0.055	PK	35.3	19.7	-74.1	30.7	0.0	-49.9	52.8	102.7	100	61	
Vert.	0.066	PK	34.3	19.6	-74.1	30.9	0.0	-51.1	51.2	102.3	100	332	
Vert.	0.150	PK	45.8	19.4	-74.1	32.0	0.0	-40.9	44.0	84.9	100	171	
Vert.	46.468	QP	38.8	11.9	7.2	31.9	0.0	26.0	40.0	14.0	100	173	
Vert.	73.954	QP	49.3	6.3	7.6	31.9	0.0	31.3	40.0	8.7	100	21	
Vert.	195.750	QP	32.2	16.3	8.7	31.8	0.0	25.4	43.5	18.1	100	301	
Vert.	260.447	QP	27.8	17.4	9.4	31.7	0.0	22.9	46.0	23.1	100	354	
Vert.	287.997	QP	35.7	18.8	9.6	31.7	0.0	32.4	46.0	13.6	100	46	
Vert.	719.994	QP	35.7	20.8	8.9	31.5	0.0	33.9	46.0	12.1	100	212	
Vert.	4874.000	PK	44.7	31.7	5.7	39.5	3.5	46.1	73.9	27.8	114	313	
Vert.	7311.000	PK	45.3	36.9	7.0	40.2	3.5	52.5	73.9	21.4	100	0	
Vert.	9748.000	PK	44.8	38.5	8.1	39.5	3.5	55.4	73.9	18.5	100	180	
Vert.	12185.000	PK	44.8	39.6	9.0	39.4	3.5	57.5	73.9	16.4	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (4.47 m / 3.0 m) = 3.5 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4874.000	AV	36.4	31.7	5.7	39.5	0.4	3.5	38.2	53.9	15.8	
Hori.	7311.000	AV	36.2	36.9	7.0	40.2	0.4	3.5	43.8	53.9	10.2	
Hori.	9748.000	AV	35.0	38.5	8.1	39.5	0.4	3.5	46.0	53.9	8.0	
Hori.	12185.000	AV	34.9	39.6	9.0	39.4	0.4	3.5	48.0	53.9	6.0	
Vert.	4874.000	AV	35.6	31.7	5.7	39.5	0.4	3.5	37.4	53.9	16.6	
Vert.	7311.000	AV	36.3	36.9	7.0	40.2	0.4	3.5	43.9	53.9	10.1	
Vert.	9748.000	AV	34.8	38.5	8.1	39.5	0.4	3.5	45.8	53.9	8.2	
Vert.	12185.000	AV	35.0	39.6	9.0	39.4	0.4	3.5	48.1	53.9	5.9	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (4.47 m / 3.0 m) = 3.5 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB

Duty factor refer to "Duty factor Calculation chart" sheet.

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Radiated Spurious Emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber	
Report No.	10949091S-A	
Date	October 11, 2015	October 18, 2015
Temperature / Humidity	25 deg. C / 51 % RH	25 deg. C / 50 % RH
Engineer	Kenichi Adachi	Hikaru Shirasawa
	(1-13 GHz)	(13-25 GHz)
Mode	Tx 11g 2462 MHz	

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	62.0	27.9	13.7	41.0	3.5	66.1	73.9	7.8	100	273	
Hori.	4924.000	PK	45.7	31.9	5.7	39.4	3.5	47.4	73.9	26.5	122	244	
Hori.	7386.000	PK	46.5	36.9	7.0	40.3	3.5	53.6	73.9	20.3	100	0	
Hori.	9848.000	PK	45.8	38.5	8.2	39.4	3.5	56.6	73.9	17.3	100	176	
Hori.	12310.000	PK	44.2	39.6	9.0	39.5	3.5	56.8	73.9	17.1	100	0	
Vert.	2483.500	PK	58.8	27.9	13.7	41.0	3.5	62.9	73.9	11.0	100	186	
Vert.	4924.000	PK	44.9	31.9	5.7	39.4	3.5	46.6	73.9	27.3	117	297	
Vert.	7386.000	PK	46.4	36.9	7.0	40.3	3.5	53.5	73.9	20.4	100	0	
Vert.	9848.000	PK	45.6	38.5	8.2	39.4	3.5	56.4	73.9	17.5	100	183	
Vert.	12310.000	PK	44.1	39.6	9.0	39.5	3.5	56.7	73.9	17.2	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(4.47\text{ m} / 3.0\text{ m}) = 3.5\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	46.7	27.9	13.7	41.0	0.4	3.5	51.2	53.9	2.8	*1)
Hori.	4924.000	AV	36.4	31.9	5.7	39.4	0.4	3.5	38.5	53.9	15.5	
Hori.	7386.000	AV	37.7	36.9	7.0	40.3	0.4	3.5	45.2	53.9	8.8	
Hori.	9848.000	AV	35.2	38.5	8.2	39.4	0.4	3.5	46.4	53.9	7.5	
Hori.	12310.000	AV	34.9	39.6	9.0	39.5	0.4	3.5	47.9	53.9	6.1	
Vert.	2483.500	AV	45.0	27.9	13.7	41.0	0.4	3.5	49.5	53.9	4.4	*1)
Vert.	4924.000	AV	35.6	31.9	5.7	39.4	0.4	3.5	37.7	53.9	16.3	
Vert.	7386.000	AV	36.6	36.9	7.0	40.3	0.4	3.5	44.1	53.9	9.8	
Vert.	9848.000	AV	35.1	38.5	8.2	39.4	0.4	3.5	46.3	53.9	7.7	
Vert.	12310.000	AV	34.8	39.6	9.0	39.5	0.4	3.5	47.8	53.9	6.1	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(4.47\text{ m} / 3.0\text{ m}) = 3.5\text{ dB}$

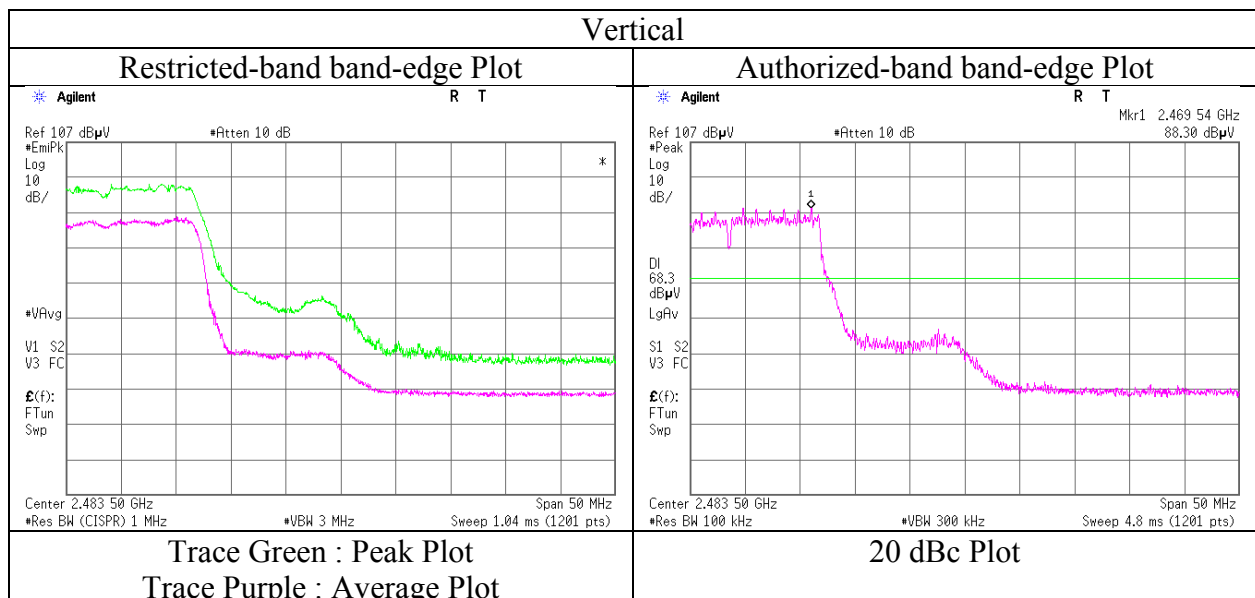
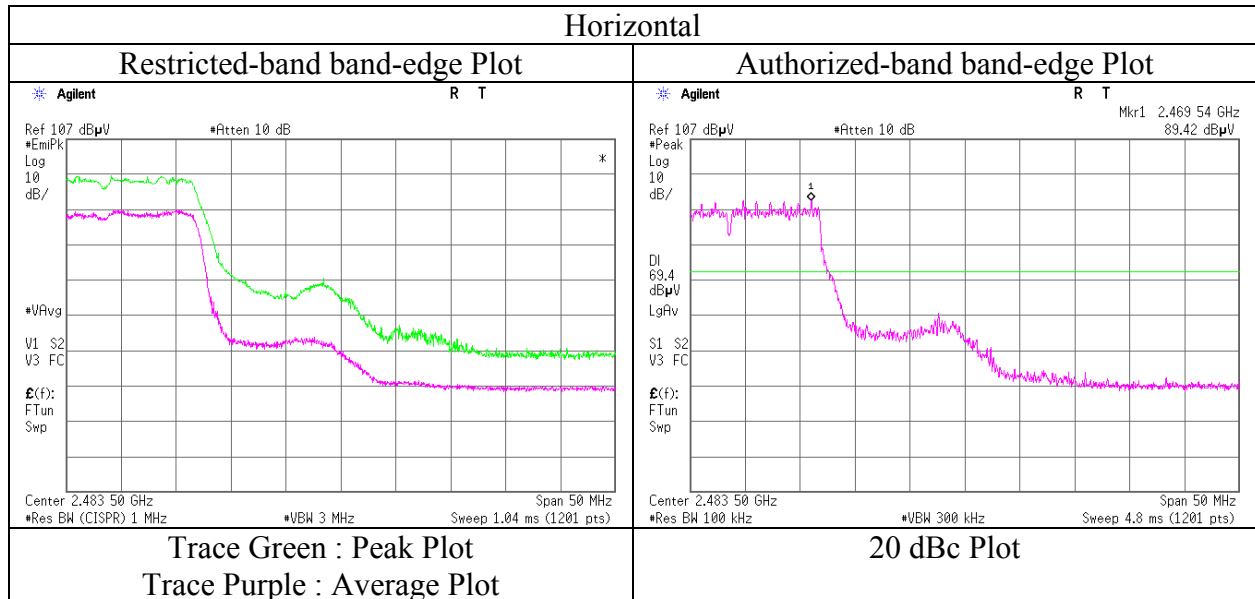
13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10949091S-A
Date	October 11, 2015
Temperature / Humidity	25 deg. C / 51 % RH
Engineer	Kenichi Adachi
Mode	Tx 11g 2462 MHz



* Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber	
Report No.	10949091S-A	
Date	October 11, 2015	October 18, 2015
Temperature / Humidity	25 deg. C / 51 % RH	25 deg. C / 50 % RH
Engineer	Kenichi Adachi	Hikaru Shirasawa
	(1-13 GHz)	(13-25 GHz)
Mode	Tx 11n-20 2412 MHz	

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	48.6	27.8	13.7	41.0	3.5	52.6	73.9	21.3	100	276	
Hori.	4824.000	PK	45.5	31.5	5.6	39.5	3.5	46.6	73.9	27.3	116	0	
Hori.	7236.000	PK	46.3	36.9	6.9	40.1	3.5	53.5	73.9	20.4	100	0	
Hori.	9648.000	PK	44.8	38.5	8.1	39.6	3.5	55.3	73.9	18.6	100	172	
Hori.	12060.000	PK	43.6	39.7	8.9	39.3	3.5	56.4	73.9	17.5	100	0	
Vert.	2390.000	PK	46.1	27.8	13.7	41.0	3.5	50.1	73.9	23.8	100	186	
Vert.	4824.000	PK	44.7	31.5	5.6	39.5	3.5	45.8	73.9	28.1	117	324	
Vert.	7236.000	PK	46.2	36.9	6.9	40.1	3.5	53.4	73.9	20.5	100	0	
Vert.	9648.000	PK	44.6	38.5	8.1	39.6	3.5	55.1	73.9	18.8	100	182	
Vert.	12060.000	PK	43.5	39.7	8.9	39.3	3.5	56.3	73.9	17.6	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (4.47 m / 3.0 m) = 3.5 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	37.4	27.8	13.7	41.0	0.4	3.5	41.8	53.9	12.1	*1)
Hori.	4824.000	AV	36.5	31.5	5.6	39.5	0.4	3.5	38.0	53.9	15.9	
Hori.	7236.000	AV	35.9	36.9	6.9	40.1	0.4	3.5	43.5	53.9	10.4	
Hori.	9648.000	AV	34.7	38.5	8.1	39.6	0.4	3.5	45.6	53.9	8.3	
Hori.	12060.000	AV	34.9	39.7	8.9	39.3	0.4	3.5	48.1	53.9	5.8	
Vert.	2390.000	AV	37.2	27.8	13.7	41.0	0.4	3.5	41.6	53.9	12.3	*1)
Vert.	4824.000	AV	35.5	31.5	5.6	39.5	0.4	3.5	37.0	53.9	16.9	
Vert.	7236.000	AV	35.8	36.9	6.9	40.1	0.4	3.5	43.4	53.9	10.5	
Vert.	9648.000	AV	34.5	38.5	8.1	39.6	0.4	3.5	45.4	53.9	8.5	
Vert.	12060.000	AV	34.8	39.7	8.9	39.3	0.4	3.5	48.0	53.9	5.9	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (4.47 m / 3.0 m) = 3.5 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB

Duty factor refer to "Duty factor Calculation chart" sheet.

*1) Not out of band emission (Leakage Power)

20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	85.5	27.8	13.7	41.0	3.5	89.5	-	-	Carrier
Hori.	2400.000	PK	45.2	27.8	13.7	41.0	3.5	49.2	69.5	20.3	
Vert.	2412.000	PK	84.0	27.8	13.7	41.0	3.5	88.0	-	-	Carrier
Vert.	2400.000	PK	43.7	27.8	13.7	41.0	3.5	47.7	68.0	20.3	

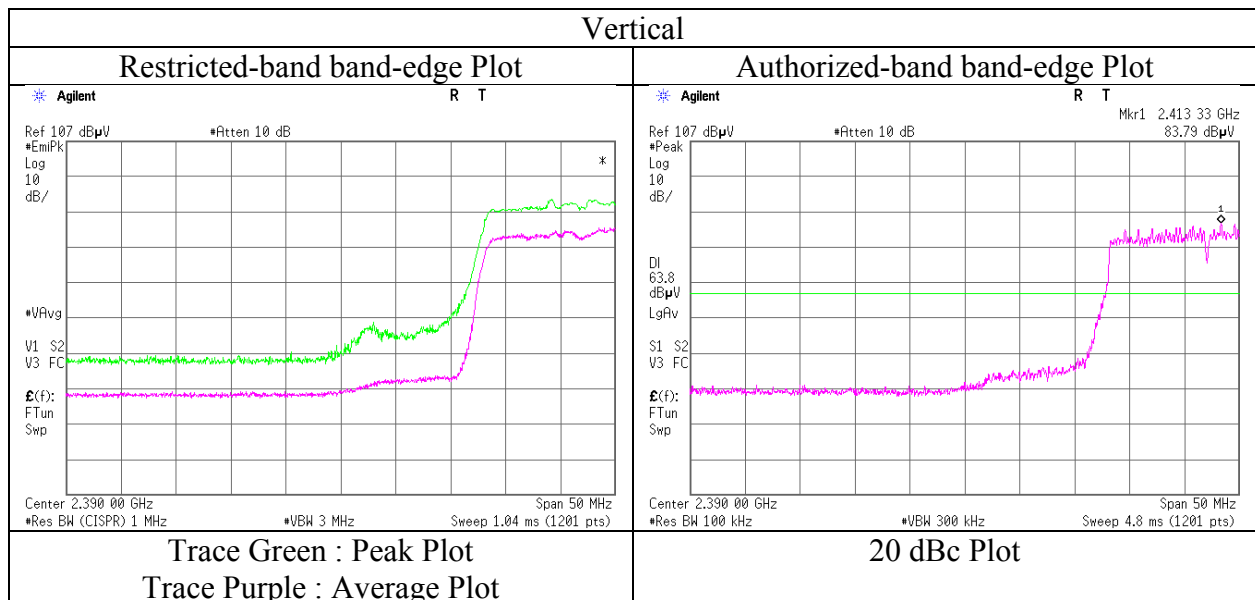
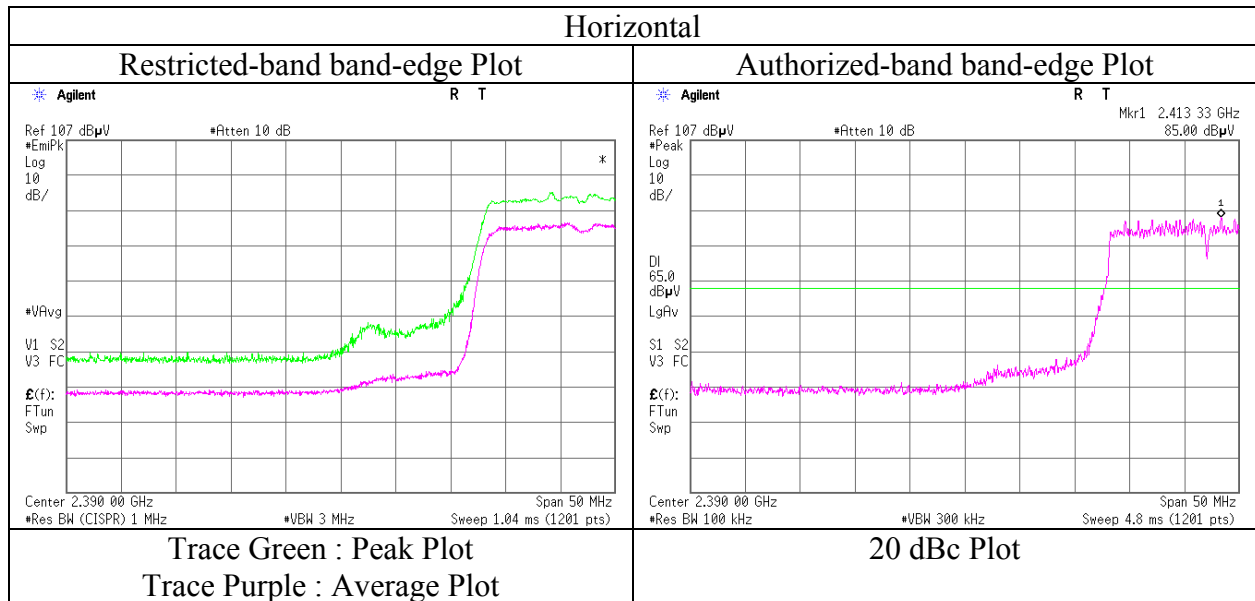
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (4.47 m / 3.0 m) = 3.5 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10949091S-A
Date	October 11, 2015
Temperature / Humidity	25 deg. C / 51 % RH
Engineer	Kenichi Adachi
Mode	Tx 11n-20 2412 MHz



* Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 10949091S-A
Date : October 11, 2015 October 18, 2015
Temperature / Humidity : 25 deg. C / 51 % RH 25 deg. C / 50 % RH
Engineer : Kenichi Adachi Hikaru Shirasawa
(1-13 GHz) (13-25 GHz)
Mode : Tx 11n-20 2437 MHz

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	4874.000	PK	45.6	31.7	5.7	39.5	3.5	47.0	73.9	26.9	112	238	
Hori.	7311.000	PK	45.3	36.9	7.0	40.2	3.5	52.5	73.9	21.4	100	0	
Hori.	9748.000	PK	45.1	38.5	8.1	39.5	3.5	55.7	73.9	18.2	100	173	
Hori.	12185.000	PK	44.9	39.6	9.0	39.4	3.5	57.6	73.9	16.3	100	0	
Vert.	4874.000	PK	44.9	31.7	5.7	39.5	3.5	46.3	73.9	27.6	113	309	
Vert.	7311.000	PK	45.4	36.9	7.0	40.2	3.5	52.6	73.9	21.3	100	0	
Vert.	9748.000	PK	45.0	38.5	8.1	39.5	3.5	55.6	73.9	18.3	100	184	
Vert.	12185.000	PK	44.8	39.6	9.0	39.4	3.5	57.5	73.9	16.4	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(4.47\text{ m} / 3.0\text{ m}) = 3.5\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4874.000	AV	36.6	31.7	5.7	39.5	0.4	3.5	38.4	53.9	15.5	
Hori.	7311.000	AV	36.3	36.9	7.0	40.2	0.4	3.5	43.9	53.9	10.0	
Hori.	9748.000	AV	35.0	38.5	8.1	39.5	0.4	3.5	46.0	53.9	7.9	
Hori.	12185.000	AV	35.0	39.6	9.0	39.4	0.4	3.5	48.1	53.9	5.8	
Vert.	4874.000	AV	35.7	31.7	5.7	39.5	0.4	3.5	37.5	53.9	16.4	
Vert.	7311.000	AV	36.3	36.9	7.0	40.2	0.4	3.5	43.9	53.9	10.0	
Vert.	9748.000	AV	34.9	38.5	8.1	39.5	0.4	3.5	45.9	53.9	8.0	
Vert.	12185.000	AV	34.9	39.6	9.0	39.4	0.4	3.5	48.0	53.9	5.9	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(4.47\text{ m} / 3.0\text{ m}) = 3.5\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber	
Report No.	10949091S-A	
Date	October 11, 2015	October 18, 2015
Temperature / Humidity	25 deg. C / 51 % RH	25 deg. C / 50 % RH
Engineer	Kenichi Adachi	Hikaru Shirasawa
	(1-13 GHz)	(13-25 GHz)
Mode	Tx 11n-20 2462 MHz	

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	63.5	27.9	13.7	41.0	3.5	67.6	73.9	6.3	100	276	
Hori.	4924.000	PK	45.7	31.9	5.7	39.4	3.5	47.4	73.9	26.5	124	237	
Hori.	7386.000	PK	46.4	36.9	7.0	40.3	3.5	53.5	73.9	20.4	100	0	
Hori.	9848.000	PK	45.7	38.5	8.2	39.4	3.5	56.5	73.9	17.4	100	178	
Hori.	12310.000	PK	44.2	39.6	9.0	39.5	3.5	56.8	73.9	17.1	100	0	
Vert.	2483.500	PK	61.4	27.9	13.7	41.0	3.5	65.5	73.9	8.4	100	184	
Vert.	4924.000	PK	44.9	31.9	5.7	39.4	3.5	46.6	73.9	27.3	115	299	
Vert.	7386.000	PK	46.5	36.9	7.0	40.3	3.5	53.6	73.9	20.3	100	0	
Vert.	9848.000	PK	45.7	38.5	8.2	39.4	3.5	56.5	73.9	17.4	100	182	
Vert.	12310.000	PK	44.2	39.6	9.0	39.5	3.5	56.8	73.9	17.1	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(4.47\text{ m} / 3.0\text{ m}) = 3.5\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	46.8	27.9	13.7	41.0	0.4	3.5	51.3	53.9	2.6	*1)
Hori.	4924.000	AV	36.5	31.9	5.7	39.4	0.4	3.5	38.6	53.9	15.3	
Hori.	7386.000	AV	37.6	36.9	7.0	40.3	0.4	3.5	45.1	53.9	8.8	
Hori.	9848.000	AV	35.3	38.5	8.2	39.4	0.4	3.5	46.5	53.9	7.4	
Hori.	12310.000	AV	34.8	39.6	9.0	39.5	0.4	3.5	47.8	53.9	6.1	
Vert.	2483.500	AV	45.1	27.9	13.7	41.0	0.4	3.5	49.6	53.9	4.3	*1)
Vert.	4924.000	AV	35.7	31.9	5.7	39.4	0.4	3.5	37.8	53.9	16.1	
Vert.	7386.000	AV	37.7	36.9	7.0	40.3	0.4	3.5	45.2	53.9	8.7	
Vert.	9848.000	AV	35.1	38.5	8.2	39.4	0.4	3.5	46.3	53.9	7.6	
Vert.	12310.000	AV	34.9	39.6	9.0	39.5	0.4	3.5	47.9	53.9	6.0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(4.47\text{ m} / 3.0\text{ m}) = 3.5\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

*1) Not out of band emission (Leakage Power)

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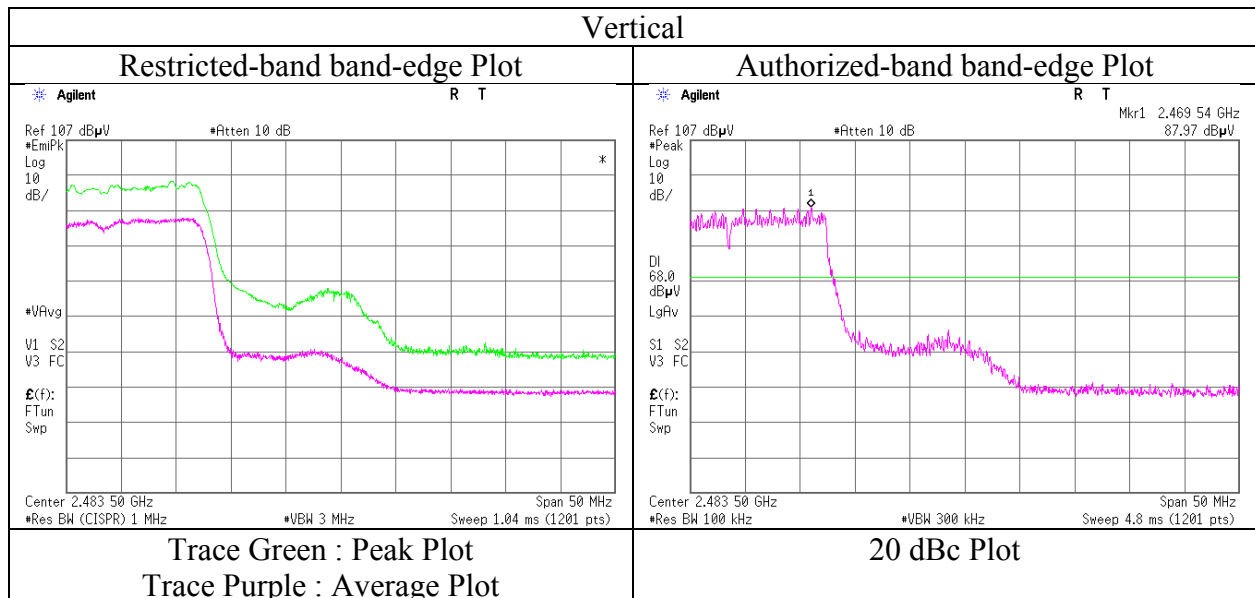
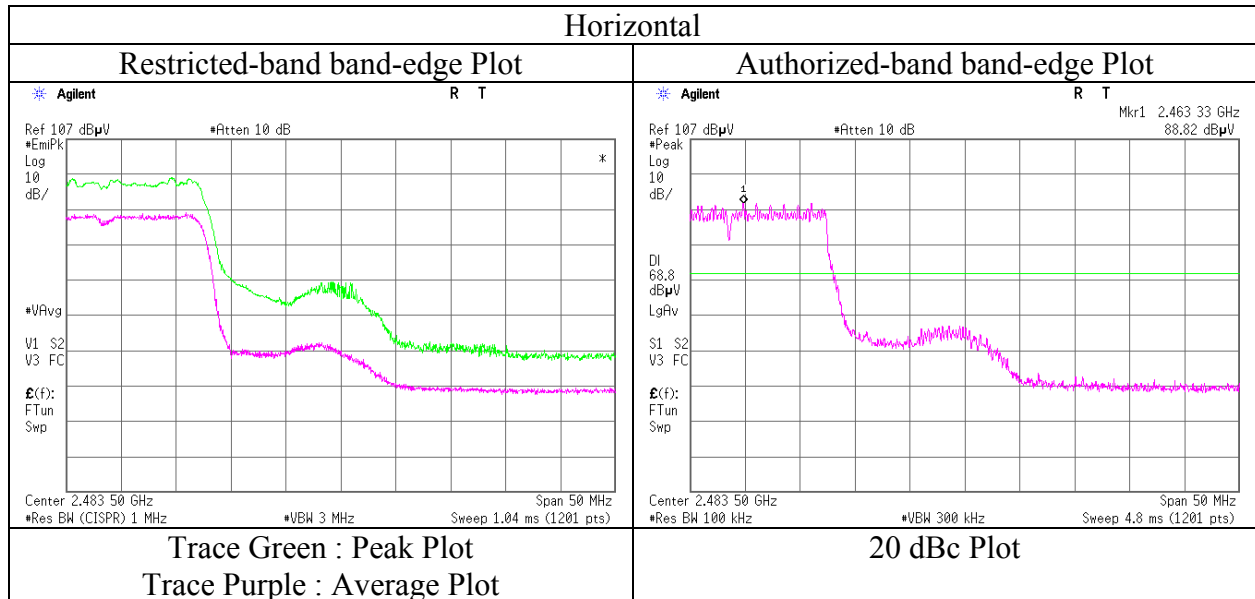
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Radiated Spurious Emission (Reference Plot for band-edge)

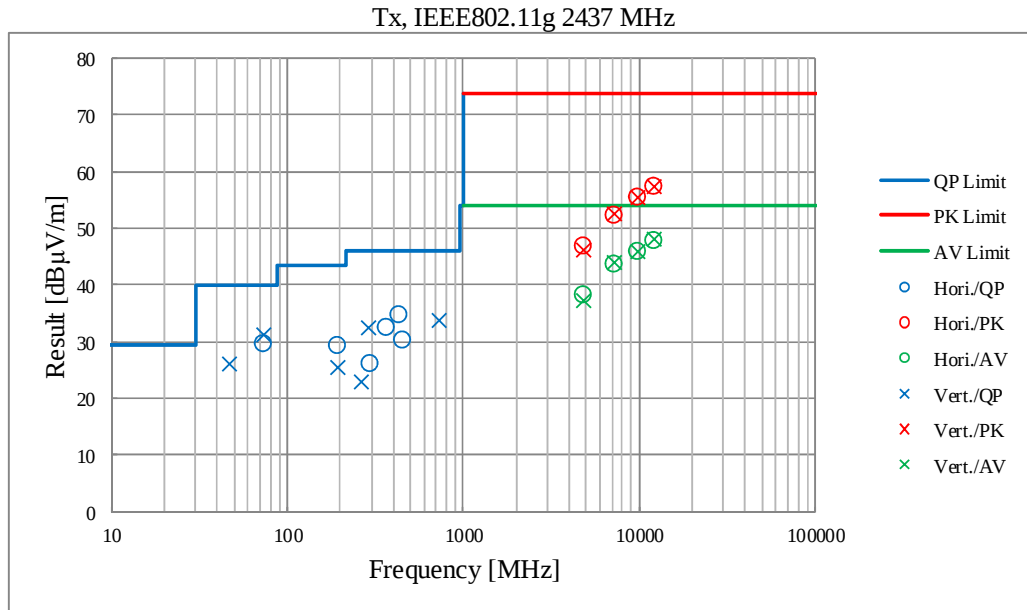
Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10949091S-A
Date	October 11, 2015
Temperature / Humidity	25 deg. C / 51 % RH
Engineer	Kenichi Adachi
Mode	Tx 11n-20 2462 MHz



* Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission
(Plot data, Worst case)

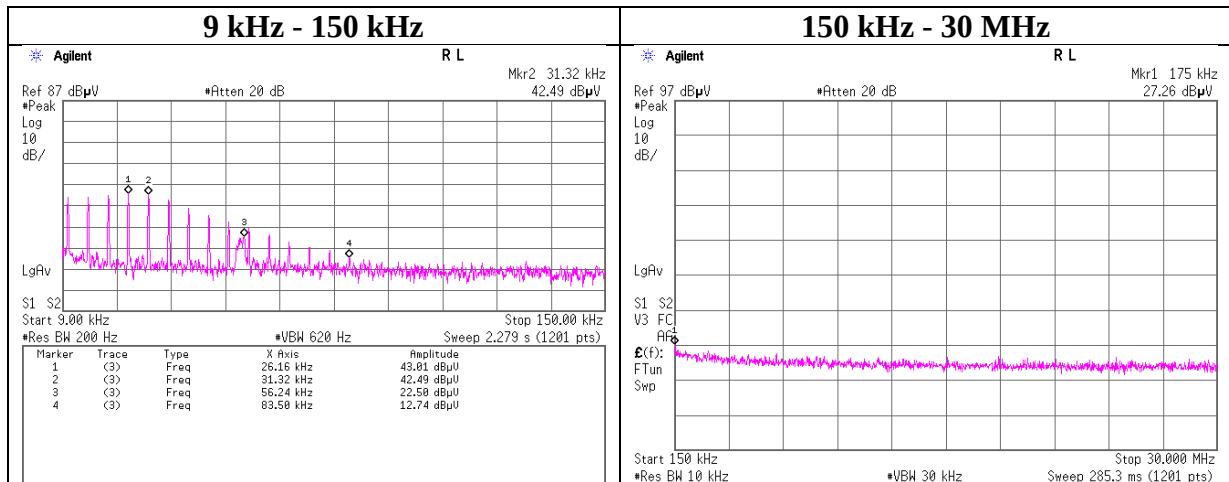
Test place	Shonan EMC Lab. No.3 and No.2 Semi Anechoic Chamber		
Report No.	10949091S-A		
Date	October 11, 2015	October 18, 2015	October 14, 2015
Temperature / Humidity	25 deg. C / 51 % RH	25 deg. C / 50 % RH	24 deg. C / 46 % RH
Engineer	Kenichi Adachi (1-13 GHz) (No.3 SAC)	Hikaru Shirasawa (13-25 GHz) (No.3 SAC)	Takahiro Suzuki (9 kHz-1 GHz) (No.2 SAC)
Mode	Tx 11g 2437 MHz		



*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission (reference data)

Test place	Shonan EMC Lab. No.2 Shielded Room
Report No.	10949091S-A
Date	September 24, 2015
Temperature / Humidity	24 deg. C / 48 % RH
Engineer	Kenichi Adachi
Mode	Tx 11g 2437 MHz



Frequency	Reading	Cable Loss	Attenuator Loss	Antenna Gain	N (Number of Output)	EIRP	Distance	Ground bounce	E (field strength)	Limit	Margin	Remark
[kHz]	[dBm]	[dB]	[dB]	[dBi]		[dBm]	[m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
26.16	-64.0	0.02	9.8	-2.9	1	-57.0	300	6.0	4.2	39.2	35.0	
175.00	-79.7	0.02	9.8	-2.9	1	-72.8	300	6.0	-11.5	22.7	34.2	

$$E = \text{EIRP} - 20 \log(D) + \text{Ground bounce} + 104.8 \text{ [dBuV/m]}$$

$$\text{EIRP} = \text{Reading} + \text{Cable Loss} + \text{Attenuator Loss} + \text{Antenna Gain} + 10 * \log(N)$$

$$\text{Reading [dBm]} = \text{Reading [dBuV]} - 107$$

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Peak Power Density

Test place Shonan EMC Lab. No.2 Shielded Room
Report No. 10949091S-A
Date September 24, 2015
Temperature / Humidity 24 deg. C / 48 % RH
Engineer Kenichi Adachi
Mode Tx

11b

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412.00	-20.92	2.08	9.93	-8.91	8.00	16.91
2437.00	-20.07	2.09	9.93	-8.05	8.00	16.05
2462.00	-20.44	2.10	9.93	-8.41	8.00	16.41

11g

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412.00	-29.07	2.08	9.93	-17.06	8.00	25.06
2437.00	-28.81	2.09	9.93	-16.79	8.00	24.79
2462.00	-28.70	2.10	9.93	-16.67	8.00	24.67

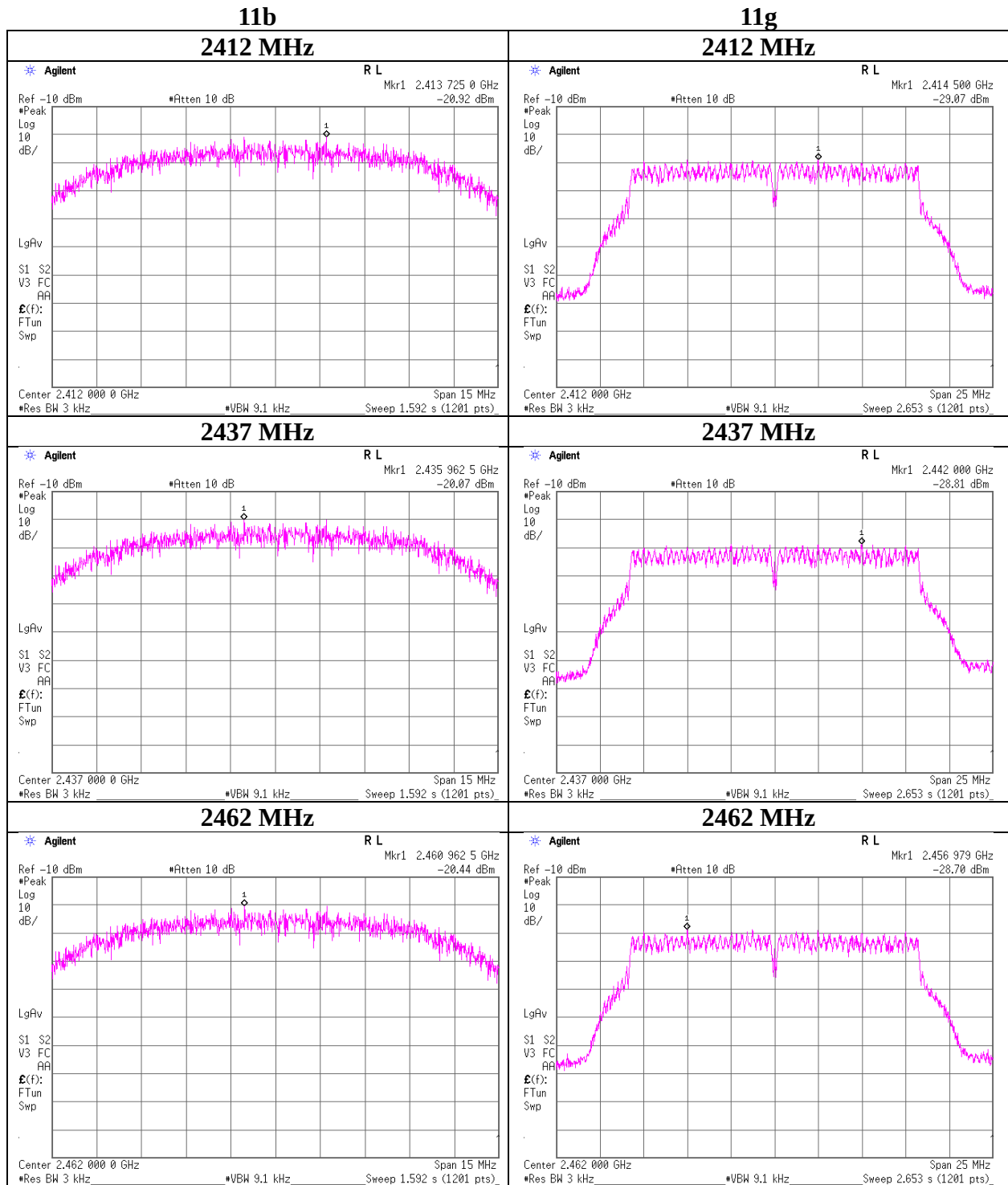
11n-20

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412.00	-29.19	2.08	9.93	-17.18	8.00	25.18
2437.00	-29.43	2.09	9.93	-17.41	8.00	25.41
2462.00	-29.12	2.10	9.93	-17.09	8.00	25.09

Sample Calculation:

Result = Reading + Cable Loss + Attenuator

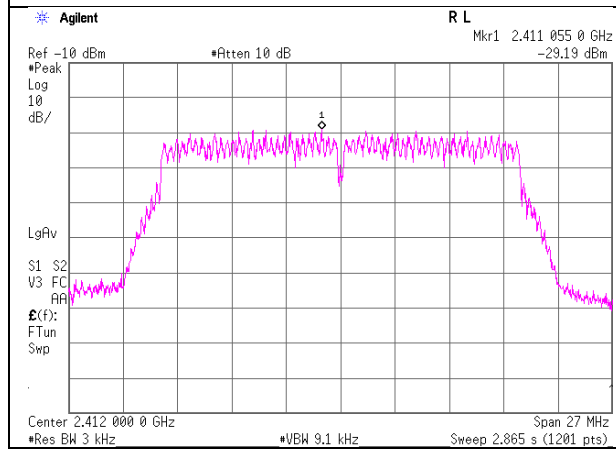
Power Density



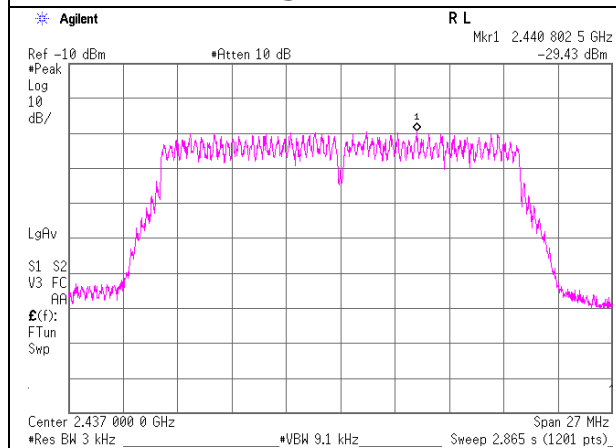
Power Density

11n-20

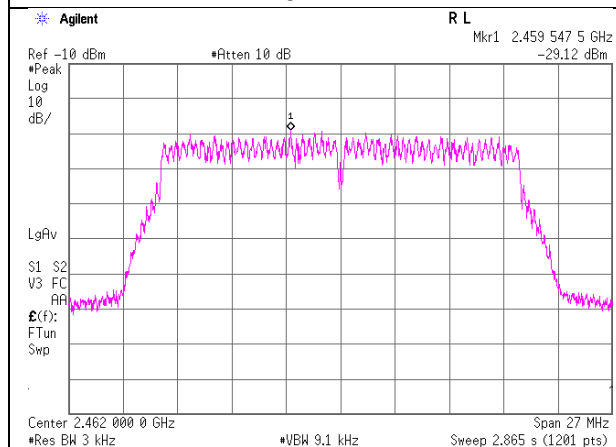
2412 MHz



2437 MHz



2462 MHz



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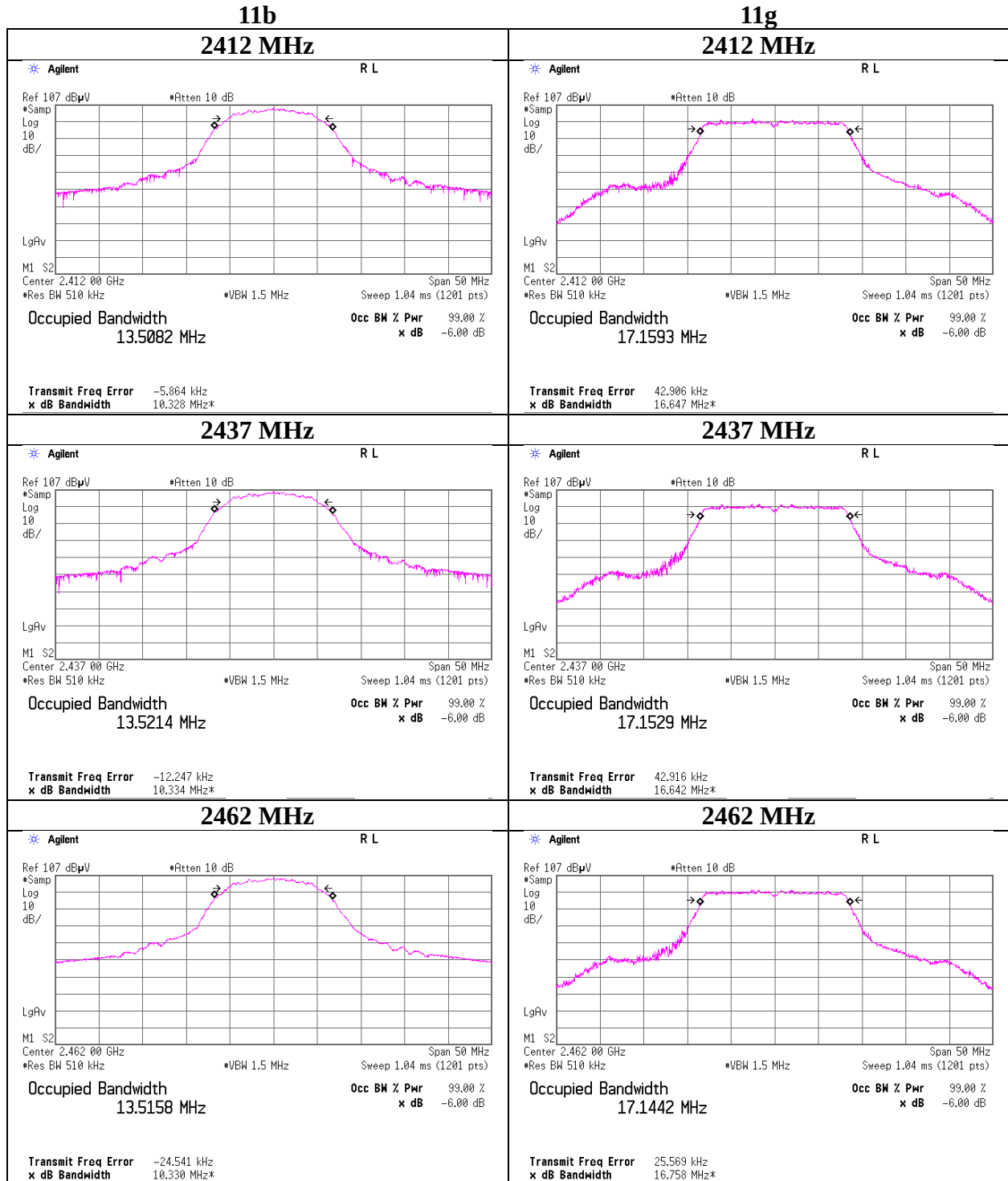
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99 %Occupied Bandwidth

Test place
Report No.
Date
Temperature / Humidity
Engineer
Mode

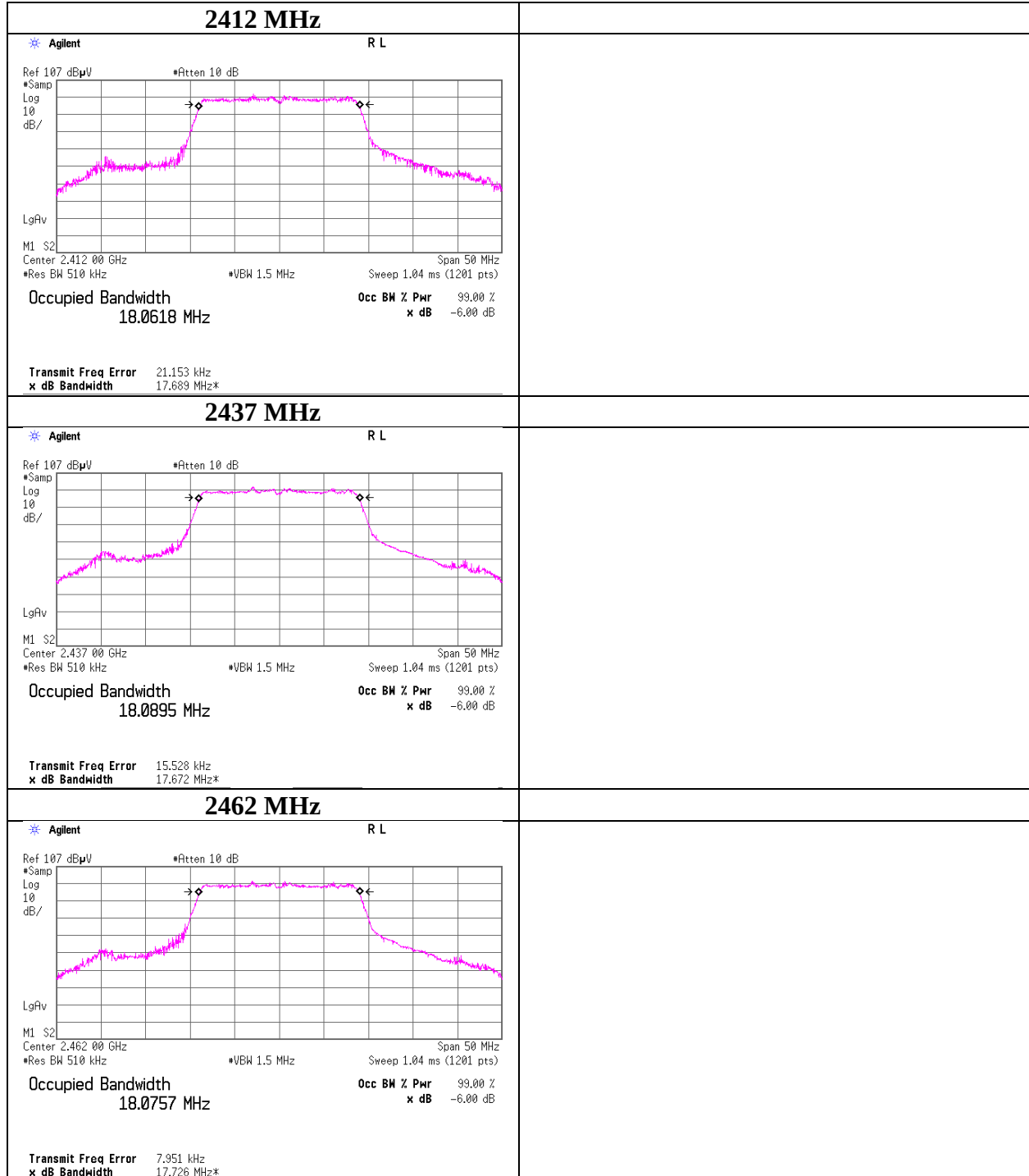
Shonan EMC Lab. No.2 Shielded Room
10949091S-A
September 24, 2015
24 deg. C / 48 % RH
Kenichi Adachi
Tx



99 % Occupied Bandwidth

Test place	Shonan EMC Lab. No.2 Shielded Room
Report No.	10949091S-A
Date	September 24, 2015
Temperature / Humidity	24 deg. C / 48 % RH
Engineer	Kenichi Adachi
Mode	Tx

11n-20



APPENDIX 2: Test instruments

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SPM-06	Power Meter	Anritsu	ML2495A	0850009	AT	2015/04/07 * 12
SPSS-03	Power sensor	Anritsu	MA2411B	0917063	AT	2015/04/07 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	AT	2015/03/26 * 12
SAT10-10	Attenuator	Weinschel Corp.	54A-10	37584	AT	2015/04/09 * 12
SCC-G13	Coaxial Cable	Suhner	SUCOFLEX 102	31599/2	AT	2015/03/11 * 12
SCC-H3	Microwave cable	Hirose Electric	U.FL-2LP-066J1-A-(200)	-	AT	Pre Check
SOS-04	Humidity Indicator	A&D	AD-5681	4061512	AT,CE	2014/12/24 * 12
SAEC-03(SVS WR)	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	RE	2015/08/28 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2015/08/11 * 12
SCC-G04	Coaxial Cable	Junkosha	J12J102207-00	JUN-12-14-018	RE	2015/06/08 * 12
SAT10-05	Attenuator(above 1GHz)	Agilent	8493C-010	74864	RE	2014/11/21 * 12
SFL-18	Highpass Filter	MICRO-TRONICS	HPM50111	119	RE	2015/04/09 * 12
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	1440491	RE	2015/05/27 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2015/05/19 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2015/03/23 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,C E,RFI,MF)	-	RE,CE	-
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2014/10/30 * 12
SJM-15	Measure	ASKUL	-	-	RE	-
SAF-02	Pre Amplifier	SONOMA	310N	290212	RE	2015/02/18 * 12
SAT6-02	Attenuator	JFW	50HF-006N	-	RE	2015/02/18 * 12
KAT3-11	Attenuator	JFW IND. INC.	50HF-003N	-	RE	2015/08/31 * 12
KBA-01	Biconical Antenna	Schwarzbeck	BBA9106	1748	RE	2014/10/06 * 12
SCC-B1/B3/B5/B7/B8/B13/SRS E-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(R F Selector)	RE	2015/04/17 * 12
SCC-B2/B4/B6/B7/B8/B13/SRS E-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(R F Selector)	RE	2015/04/17 * 12
KLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	170	RE	2014/10/06 * 12
SOS-03	Humidity Indicator	A&D	AD-5681	4063325	RE	2014/10/30 * 12
STR-07	Test Receiver	Rohde & Schwarz	ESU26	100484	RE,CE	2015/09/04 * 12
SJM-14	Measure	ASKUL	-	-	RE,CE	-
SAEC-02(NSA)	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	RE	2015/07/15 * 12
SLP-02	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100218	RE	2014/11/30 * 12
SAT6-07	Attenuator	JFW	50HF-006N	-	RE	2015/02/18 * 12
SCC-B12/B13/S RSE-02	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-270(R F Selector)	CE	2015/04/17 * 12
SLS-03	LISN	Rohde & Schwarz	ENV216	100513	CE(EU T)	2015/02/25 * 12
SLS-04	LISN	Rohde & Schwarz	ENV216	100514	CE(AE)	2015/02/25 * 12
SAT3-06	Attenuator	JFW	50HF-003N	-	CE	2015/02/18 * 12
STM-02	Terminator	TME	CT-01 BP	-	RE	2014/12/19 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2015/03/26 * 12
SCC-G15	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	RE	2015/03/11 * 12
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2015/03/17 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2015/03/23 * 12

The expiration date of the calibration is the end of the expired month.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item: CE: Conducted Emission test
RE: Radiated Emission test
AT: Antenna Terminal Conducted test

UL Japan, Inc.

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